A MONOGRAPH OF THE AUSTRALIAN LORICATES.

(Phylum Mollusca—Order Loricata.)

By Tom Iredale and A. F. Basset Hull.

V.

Family Cryptoconchidae.

This, and the next Family—*Cryptoplacidae*—are very closely related, and indeed have been merged into one by Thiele; but as the members of the latter are well differentiated and are common characteristic Australian forms, we retain the two. The two families together constitute a remarkable section of the Order, and might even be regarded as a primary subdivision, a very notable feature being the scant slitting of the anterior valve. The slits vary from none to five, every other group having more than eight (with the exception of *Schizochiton*, which has six, but is obviously descended from an eight-slit form). In addition the tegmentum shows throughout a tendency to reduction, and the articulamentum appears as sidewings, but no reduction generally in the size of the shell takes place. In the family *Cryptoplacidae* the shell itself diminishes so that in some cases it is almost lost. The variation in the slitting of the posterior valve of the *Cryptoconchidae* is also noteworthy as the range is from some six to none, but only in one section does the insertion plate itself diminish.

The species are mostly small; are not uncommon, and are individually variable. They occur chiefly between tide marks, but are not so gregarious as some *Ischnochitons*, e.g., *Ischnoradsia*, but appear to be more solitary. Many species occur in southern waters, but the family is also found in tropical waters where, however, the *Cryptoplacidae* is more peculiarly represented.

The sculpture of the *Cryptoconchidae* consists of nodules, more or less elongated, and in many species the lateral and central areas show no differentiation, while the dorsal area is only indicated by a slight change of sculpture. No linear series can be arranged so as to suggest the evolution of the species, as the variation has been in every direction, and the species showing the most highly developed superficial sculpture—an important item in a group with such generalised ornamentation—has the most primitive (many slit) tail valve. This occurs in more instances than one, and even in the genus from which the family takes its name.* Contrariwise, the species showing the most specialisation as to the tail valve shows a superficial sculpture and form inseparable from other species with a generalised tail valve.

**Cryptoconchus.*—One of the most abnormal Loricates, the animal being very large, with a huge leathery girdle enclosing a large shell of which practically only the dorsal area is exposed. *C. porosus* was long regarded as a unique example of the genus, but Nierstrasz has recently named a second species from the Moluccas, a peculiar case of discontinuous distribution, as the original species is confined to New Zealand.

From the above it will be gathered that "Acanthochitons" are difficult to indicate by positive characters of high value, the anterior valve few-slit, generally five; the median valves one-slit, rarely none; the tail valve many to none; the plate sometimes degenerating into a callus.

The number of species is not yet satisfactorily determined, as several have been described from single specimens, and the extent of individual variation in species is not yet well known. Nor are the groups clearly distinguished, the best marked, as more material is secured, showing intermediate forms. At present an artificial key can be provided by means of the tail valve, supported by superficial sculpture, the radula being available only in connection with the higher groupings, and the gills being invariably short.

This artificial separative scheme is as follows:—

Posterior valve two-slit, sometimes showing interslitting, in some cases the slits becoming obsolete:
  Insertion plate directed backward .. .. *Acanthochiton.*
Posterior valve many-slit:
  Anterior valve five-ribbed .. .. *Notoplax.*
  Anterior valve without ribbing:
    Insertion plates large:
      Sculpture of linear ridges only .. .. *Glyptelasma.*
Posterior valve with insertion plate short, many-slit, like that of an Ischnochiton, becoming callused with age .. .. *Craspedoplax.*
  Anterior and median insertion plates long:
    Girdle anteriorly produced .. .. *Craspedochiton.*
All valves unslit; tegmentum small; girdle leathery .. .. *Choriplax.*

Genus ACANTHOCHITON.

Acanthochitona Gray, London Medical Repository, xv., 1821, 234. Type by monotypy *Chiton fascicularis* Linn.

Acanthochites Risso, Hist. Nat. l'Eur. Merid., iv., 1826, 268. Type by virtual tautonomy *A. communis* Risso = *C. fascicularis* Linn.

Phakellopleura Guilding, Zool. Journ., v., 1830, 28. Type by monotypy *Chiton fascicularis* Sowerby.

Hamachiton Middendorf, Mem. Sci. Nat. Imp. Sci. St. Petersb., vi., 1848, 83-98. Type by present designation *Chiton fascicularis* Linn.

Platysemus Middendorf, Mem. Sci. Nat. Imp. Sci. St. Petersb., vi., 1848, 83-98. Type by present designation *Chiton fascicularis* Linn.

Stectoplax Dall, Proc. U.S. Nat. Mus., iv., 1882, 284, 288. Type by monotypy *Stectoplax porrecta* Cpr. (Japan).

Anisochiton Fischer, Manuel de Conch., 1885, 881. Type by present designation *Chiton fascicularis* Linn.

Shells small, elongate; pustulose sculpture; lateral and central areas not differentiated; no radial ribbing on anterior or posterior valves; latter normal to small; insertion plates and sutural laminae very large; usually five, rarely three slits in anterior valve, slits sometimes obsolete; median valves one-slit, rarely unslit; posterior valve with large insertion plate, one slit on each side; girdle leathery, more or less covered with delicate or strong spicules, notably hunched and larger at the sutures, though apparently missing in some species when the shell is dried.

In the group as here utilised several sections can be noted, and it is possible

that these should be regarded as distinct genera. They can be indicated as follows:—

Posterior valve two-slit only:
Girdle delicately spiculose:
Tufts large, siliceous:

Dorsal area wedge-shaped .. .. series of *granostriatus*.
Girdle coarsely spiculose:
Tufts coarse .. .. series of *coxi*.

Girdle leathery:
Tufts asbestoid in pockets, visible on underside of girdle
.. .. series of *sueurii*.
Girdle finely spiculose, tufts large:

Dorsal area linear:
Insertion plate of posterior valve not sinuate .. .. .. *pilsbryi*.
Posterior valve with two side slits, interslit
.. .. series of *wilsoni*, *crocodilus*, *curiosus*, *sphenorhynchus*, and *aenigma*.

This section can be separated into two groups, very different at sight, though technically small separative characters only can be cited; the girdle tufts in one case disappearing in the dried shell, though noticeable in life; in the other the tufts remaining prominent when dried.

The species of this genus can, in most cases, be further grouped in series, the superficial appearance being generally similar and the differences being found in details of sculpture, colour of shell and spicules or tufts, dimensions, and habitat. So much of the authors' descriptions is mere repetition that we here give a general diagnosis of the main features of a series, limiting the text relating to the individual species to the synonymy, the differential details of sculpture, etc., and the distribution.

(i.). Series of *A. granostriatus*.

Shells medium, elongate, semi-carinated. Colour variable within limits of ochraceous to brown, dull greenish-grey or whitish, in some instances enlivened with bright orange-yellow, very rarely showing reds or blues, and then only on beaks of one or two valves. Exposed portion of valves in living examples barely one-fourth of total width, in dried specimens the girdle shrinks to less than one-half, leaving the exposed portion of the valves equal to the width of the girdle on both sides. The sculpture is composed of pustules, elongate, oval, or circular; concave, flat, or slightly convex. The anterior valve is either five-waved, or rounded without visible undulations. There is no differentiation between the lateral and central areas of the median valves, which have a distinct wedge-shaped jugal area terminating posteriorly in a pronounced beak, and this area is of varied sculpture. The posterior valve has the mucro post-central, and the post-mucronal area is more or less concave. The girdle is densely clothed with minute spicules, varying in colour with the species; the sutural tufts are disproportionately large (as compared with other members of the family) and also vary in colour. The interior features comprise varying colours; a squared and minutely crenulated sinus; long insertion plates; slits 5-1-2, and the insertion plate of the posterior valve has the slits on each side, and the plate between these slits is sinuated.

Acanthochiton granostriatus.

(Plate ix., figs. 5-9.)

Acanthochites granostriatus Pilsbry, Nautilus, viii., 1894, 119. Port Jackson and Port Hacking, N.S.W. Type in coll. Acad. Nat. Sci. Philad. Pilsbry, Proc. Acad. Nat. Sci. Philad., 1894, 81, pl. ii., f. 1-6, pl. iv., f. 37.

Acanthochites tatei Torr & Ashby, Trans. Roy. Soc. S. Aust., xxii., 1898, 219, pl. vii., f. 7. Encounter Bay, South Australia. Type in coll. Torr.

Acanthochiton granostriatus May, Illus. Index Tas. Shells, 1923, pl. xv., f. 13.

Colour brown to bluish-grey, with bright yellow markings, brilliant when alive, subdued when dried.

Anterior valve rounded, covered with oval flattened pustules which are flat topped; five low rounded undulations.

Median valves with lateral and central areas similarly pustulose; dorsal area trigonal, smooth, though colour lines are seen, suggesting grooves.

Posterior valve large, with mucro post-central, elevated; postmucronal area a little concave below the mucro, a small triangular smooth area extending to mucro; rest of valve pustulose.

Girdle densely minutely spiculose; large sutural tufts present, dull olive-green or brown.

Interior pink, stained darker in the middle of the cavity (Pilsbry). Most examples examined by us have a dark green interior.

Dimensions: 9 x 3½ mm. (Type), 10 x 7 mm. (Co-type in spirit). We have examples of dried shells measuring 17 x 7 mm.

Station: Under stones, commonly between tide marks, though occurring also below low water mark.

Habitat: New South Wales (type locality), South Queensland, Victoria, South Australia, North Tasmania.

Remarks: This shell is easily distinguished by its delicate appearance and beautiful colouration. The waves in the anterior valve are a noticeable feature, while the spicules are slender and generally pale greenish in colour. The pustules are oval, flattened, with flat tops, and are fairly crowded. The dorsal area is smooth.

Geographical variation is not marked, and we have been unable to distinguish subspecies. The name *tatei* was given to a shell supposed to be new by Torr and Ashby, but which the authors now regard as identical with *granostriatus;* in case series may prove the South Australian form separable the name is available.

Acanthochiton bednalli.

(Plate ix., figs. 1-4.)

Acanthochites bednalli Pilsbry, Proc. Acad. Nat. Sci. Philad., 1894, 81, pl. ii., f. 7-11. Gulf St. Vincent, South Australia. Type in coll. Acad. Nat. Sci. Philad.

Acanthochiton bednalli var. *johnstoni* Ashby, Trans. Roy. Soc. S. Aust., xlvii., 1923, 231, f. Carnarvon, Western Australia. Type in coll. Ashby.

Acanthochiton bednalli May, Illus. Index Tas. Shells, 1923, pl. xv., f. 12.

Colour sombre, dull grey and white.

Anterior valve rounded, covered with minute rounded oval pustules which are flat topped; no undulations or elevations present.

Median valves with lateral and central areas sculptured as anterior valve; dorsal area longitudinally striate; the seventh valve shows a faint ridge separating the lateral and central areas.

Posterior valve with small triangular striate area reaching to the mucro,

which is situated at about the posterior four-fifths; the remainder of the valve pustulose; post-mucronal area not concave.

Girdle having large green sutural tufts.

Interior: Variable from white to green.

Dimensions: 13 x 6½ mm. (Type, dry). Average dry examples, 26 x 12 mm.

Station: Between tide marks, under stones.

Habitat: South Australia (Sultana Bay example described), Victoria, Tasmania.

Remarks: This shell is separable from *A. granostriatus* by its coarser appearance, duller coloration, lack of waving in the anterior valve, and the coarse green spicules of the sutural tufts. The main differential feature is the sculpture of the dorsal area, fine longitudinal sulci being present, whereas in *granostriatus* this portion of the shell is smooth. This character requires careful verification as the smooth shell is coloured with longitudinal lines which look like sulci, and the shell must be closely examined by reflected light to determine this sculpture. Variation in the breadth of the jugal area is also present, and it is suggested that this may be a sexual feature.

Geographical variation has not been determined, as though Ashby named a Western Australian form (*johnstoni*) he gave no differential features from *granostriatus*, while placing the shells examined as a variety of *bednalli*. Until specimens are re-examined we leave Ashby's variety where he placed it. Specimens from southern Tasmania show variation in the breadth of the dorsal areas, and also in the form of the pustules, but we have not discerned any constant features.

Acanthochiton macrocystialis.

(Plate ix., figs. 20-23.)

Acanthochiton macrocystialis Ashby, Trans. Roy. Soc. S. Aust., xlviii., 1924, 324, pl. xxxi., f. 3 a, b, c. Port Arthur, South Tasmania. Type in coll. Ashby.

This recently described species is compared with *granostriatus, bednalli,* and *gatliffi,* but the diagnostic features are not satisfactory, while the figures provided are not much more helpful. According to the description this species has a smooth jugal area, broader than in *granostriatus* or *bednalli*, while the granules are intermediate in size between those of the two compared species, a physical impossibility as each varies; further those of *macrocystialis* are "often pointed" while those of *bednalli* are "bluntly obovate," but the type of the latter has the granules "pointed." Such descriptions are difficult to understand, and the species named still more difficult to comprehend. The girdle is described as spiculose, whereas that of *gatliffi* is spongy. Ashby gives "slits 4—0—1—3," but the normal formula is 5—1—2.

Ashby regards the "habitat of this species (within kelp-roots) as constituting a discovery of exceptional interest," but this station has been well known in connection with Neo-Zelanic species for over fifty years, and it was through this fact that the late Mr. W. L. May discovered this species, being incited to search the station by Iredale's constant urging.

Acanthochiton thackwayi.

(Plate ix., figs. 10-11.)

Acanthochiton thackwayi Ashby, Trans. Roy. Soc. S. Aust., xlviii., 1924, 318, pl. xxxi., f. 1, 2. Fly Point, Port Stephens, New South Wales. Type in coll. Ashby.

Another recently described species, the status of which is better fixed, and through study of one of Thackway's original specimens we find that this is a definite form apparently representing *bednalli* in New South Wales waters. The general appearanee recalls that of *bednalli,* but the pustules are circular and convex and more separated than in the southern species, while the smooth dorsal area is eharacteristic of *granostriatus.* Anterior valve obscurely five-waved; tufts large, greenish-white; interior greenish-white. Ashby does not give the internal features, while his measurements are 9 x 4.5, including the hair tufts; shell itself only 7 x 4.5. The dimensions of Thackway's specimen are 8 x 4, while Hull has specimens collected at Shellharbour, N.S.W., measuring 11 x 6 mm.

Habitat: Port Stephens and Narrabeen (Thackway), Port Jackson (Hull), Shellharbour (McAndrew), New South Wales.

Acanthochiton gatliffi.

(Plate ix., figs. 24-25.)

Acanthochiton gatliffi Ashby, Trans. Roy. Soc. S. Aust., xliii., 1919, 398, pl. xlii., f. 2-5. Port Lincoln, South Australia. Type in coll. Ashby. May, Illus. Index Tas. Shells, 1923, pl. xv., f. 15.

This species was described from a shell measuring 5 x 2½ mm., taken at Port Lincoln, South Australia. Mr. C. J. Gabriel has furnished us with a specimen measuring 8 x 4 mm., dredged in 8 fath., off Point Cook, Port Phillip, Victoria, and determined by the author. Judging from this example, which we figure, the species is easily separable by its very coarse sculpture, the lined and posteriorly pitted dorsal area. The anterior valve has the pustules somewhat convex and circular, but in the latero-pleural areas the pustules are more elongate ovals, arranged linearly near the jugum, radially towards the lateral edge; the jugum is pitted; the posterior valve has the mucro more elevated, the postmucronal slope steeper than *granostriatus.*

The girdle tufts are large, like those of *bednalli,* the spicules bluish-white; girdle probably wide with minute scale-like spicules present. Compared with Ashby's description the rays on the anterior valve are obscure. There appear to be only three slits. Ashby writes five and figures four. The side slits are obscure.

Habitat: Port Lincoln, S.A. (Type) Port Phillip, Victoria (Gatliff and Gabriel). Tasmania (May).

Acanthochiton shirleyi.

(Plate ix., figs. 16-19.)

Acanthochiton shirleyi Ashby, Trans. Roy. Soc. S. Aust., xlvi., 1922, 13, pl. iii., f. 2 a-c. Northwest Reef, Capricorn Group, Queensland. Type in coll. Asbby.

The sculpture of this shell consists of small, flat, circular pustules; the posterior valve with suboval tegmentum, the mucro posterior and planate but terminal. The interior characters are peculiar, the anterior insertion plate being much produced; the seventh valve (figured) with tegmentum elongate, almost parallel sided, the sutural plates large, the sutural laminae produced forward triangularly with a wide sinus; the insertion plates of the posterior valve showing triangular sutural laminae winged laterally, posteriorly perpendicularly lengthened, two-slit and sinuate.

Dimensions: 11 x 5 mm. (curled).

Habitat: Queensland, all along the Great Barrier Reef.

Remarks: Specimens sent by Dr. Shirley to Iredale were not named on account of their defective condition. Ashby has described these shells, naming the species in honour of the collector. The surface was greatly eroded, and the author's characters are partly based on this feature. The species appears to be the coral reef representative of the *bednalli* series, as Hedley has collected it at various points on the Great Barrier Reef.

Acanthochiton complanatus.

(Plate ix., figs. 12-15.)

Acanthochiton complanatus Hull, Proc. Roy. Soc. Queensland, xxxvi., 1924, 112, pl. xxi., f. 2 a-c. North Queensland. Type in Queensland Museum.

This is the Queensland mainland representative of *granostriatus* and agrees in colouration and style with that species, but the pustules are circular and flattened, and the dorsal area is only smooth anteriorly, broken and semi-pustulose towards the beaks of the valves. It differs from *shirleyi* at sight in the more numerous and more crowded pustulation, in its elevation, and its much finer spiculose bunches; the interior is bluish-white.

Dimensions: 15 x 8 mm. (Type).

Station: Under small stones embedded in coral sand.

Habitat: Magnetic Island, off Townsville, North Head and Stone Island, Port Denison, Howick I. (north of Cooktown), and Thursday I., Queensland.

(ii.). Acanthochiton coxi.

(a). Acanthochiton coxi coxi.

(Plate ix., figs. 26-30.)

Acanthochites coxi Pilsbry, Nautilus, vii., Feb., 1894, 119. Port Jackson, New South Wales. Type in coll. Acad. Nat. Sci. Philad. Proc. Acad. Nat. Sci. Philad., May, 1894, 80, pl. iii., f. 21-26, pl. iv., f. 34.

Acanthochiton coxi Ashby, Trans. Roy. Soc. S. Aust., xlvi., 1922, 18 (from Balmoral, North Borneo!).

Shell large, a little elevated, elongate, semi-carinated. Colour dark greenish, maculated with white or yellow.

Anterior valve semicircular, covered with elongate pear-shaped pustules, convex, closely packed but not overlapping; no radial ribbing.

Median valves with narrow, almost linear dorsal area, longitudinally grooved; latero-pleural areas closely packed with elongate convex pustules radiating from the beak; pleural area not differentiated but pustules smaller and still more crowded.

Posterior valve large; mucro post-central; ante-mucronal area wedge-shaped, narrow, grooved on each side and having longitudinal rows of elongate pustules; remainder of valve with similar smaller pustules radially arranged.

Girdle densely very coarsely spiculose, spicules broad at base and rapidly tapering; large tufts of longer spicules at sutures.

Interior: Pink (Pilsbry), but examples are frequently met with in which there is no trace of this colour, and most of the Shellharbour examples have a greenish interior. The insertion plates of the anterior valve are very long, and of the median valves large; the posterior valve is sinuate between the slits, sometimes with interslitting; slits 5—1—2.

Dimensions: 33 x 12 mm. (Type). Paratype in spirit, 23 x 13 mm.

Station: Under or at the edge of insertion of stones in sandy or muddy

situations.

Habitat: New South Wales. (Type locality: Port Hacking, N.S.W., specimen described, Balmoral, Middle Harbour, Port Jackson). Bulli, Shellharbour, etc., N.S.W.

Remarks: This is a strikingly handsome shell when well-preserved, the pear or tear-shaped (May & Torr's *lachrymosus*) pustules furnishing a very well marked character. It prefers sheltered situations such as harbours and almost landlocked bays. McAndrew has taken a very fine series at Shellharbour, N.S.W., where the rock is sandstone, numerous fragments of which are embedded in muddy sand.

(b). Acanthochiton coxi lachrymosus.

(Plate ix., figs. 27-29.)

Acanthochites lachrymosus May & Torr, Pap. & Proc. Roy. Soc. Tas., 1912, 36, pl. i., f. 1-4. Frederick Henry Bay, Tasmania. Type in Tasmanian Museum.
Acanthochiton coxi May, Illus. Index Tas. Shells, 1923, pl. xvi., f. 1.

The south Tasmanian shells have the tear-shaped drops more confused and overlapping, while the Victorian ones from Portland (C. J. Gabriel) have the drops smaller and separated. The girdle spicules of all the southern shells are smaller and more delicate than those of the northern ones. Undoubtedly the two forms are subspecifically distinct.

Dimensions: 34 x 12½ mm.

Habitat: Victoria, Tasmania.

(iii.). Series of *A. sueurii.*

Acanthochiton sueurii.

(Plate x., figs. 1-4.)

Chiton sueurii Blainville, Dict. Sci. Nat., xxxvi., 1825, 553. King George Sound, South-west Australia. Type in Paris Museum.
Chiton (Acanthochiton) asbestoides E. A. Smith, Zool. Coll. Alert, 1884, 83, pl. vi., f. 6. Flinders Island, Bass Strait. Type in Brit. Mus.
Acanthochites asbestoides Pilsbry, Man. Conch., xv., 1893, 17, pl. 2, f. 55. Proc. Acad. Nat. Sci. Philad., 1894, 79, pl. iii., f. 16-20.
Acanthochiton sueurii May, Illus. Index Tas. Shells, 1923, pl. xvi., f. 3.

Shell medium to large, depressed, semi-carinated. Colour black or bluish-slate, sometimes white.

Anterior valve rounded, with faint indication of ribbing, covered with small oval pustules.

Median valves similarly sculptured, pustules smaller on dorsal area, which is not differentiated, but the lateral areas are a little raised; valve ii. is longer than the others.

Posterior valve very small; mucro post-central; post-mucronal area sloping, protractive, pustulose throughout.

Girdle leathery, broad, having long ashestoid golden or silvery tufts, the bases of which are distinctly visible on the under side of the girdle.

Interior: Deep blue; slits 5—1—2.

Dimensions: 25 x 15 mm. (Tasmania).

Station: Under or at the edge of insertion, occasionally on the upper surface of stones embedded in sand, from median to below low tide mark.

Habitat: Western Australia (King George Sound example described), South Australia, Victoria, Tasmania.

Remarks: This is a very common shell in Queen Charlotte Sound, Western Australia, nearly every example being much eroded. King Island, Bass Strait, examples are generally larger, and less eroded. Shells from the latter locality also have a smoother dorsal area; the pustules are larger and rounded towards the edge.

Acanthochiton kimberi.

(Plate x., figs. 5-12.)

Acanthochites kimberi Torr, Trans. Roy. Soc. S. Aust., xxxvi., 1913, 167, pl. vi., f. 5 a-f. Kangaroo Island, South Australia. Type in coll. Torr.

Acanthochiton kimberi May, Illus. Index Tas. Shells, 1923, pl. xv., f. 16.

Acanthochiton maxillaris Ashby, Trans. Roy. Soc. S. Aust., xliii., 1919, 397, pl. xli., figs. 5-6; pl. xlii., f. 1. Marino, South Australia. Type in coll. Ashby.

Shell medium to small, elongate, depressed. Colour purple-brown, varied with pale yellow.

Anterior valve pustulose, undulated, not ribbed; apex almost smooth; pustules increasing in size and becoming elongate towards the edge, where they are rather separate; the pustules are convex-topped ovals.

Median valves with latero-central areas pustulose as anterior valve; dorsal area narrow, triangular, with small longitudinal cuts and thus separated from the latero-central areas, but with no separative line.

Posterior valve small, mucro central; post-mucronal area sloping; ante-mucronal wedge small, sculpture as in median valve but less elongate pustules.

Girdle wide, leathery; sutural tufts long, asbestoid.

Interior greenish to bluish; slits variable.

Dimensions: 10 x 4 mm. (Type), 15 x 6 mm. (maximum measured).

Station: Under stones between tide marks.

Habitat: South Australia, Victoria, Tasmania, New South Wales (Port Jackson example described).

Remarks: Described from Aldinga, South Australia, by Torr, the sculpture is said to be of fine, fairly numerous pustules. The anterior valve has three slits in the insertion plate which is fairly long; one slit on each side of the median valves, and two side slits in the posterior valve which has the insertion plate directed backwards. The asbestoid tufts are noted, and three "sharply defined" riblets on the anterior valve. New South Wales shells agree generally, but present some peculiarities which render it difficult to decide as to their exact status. The sculpture varies a little from that described by Torr, the pustules being as given in our description. The interior features vary so that while the anterior insertion plate is generally three-slit the slits become insignificant and even obsolete, and the median valves are generally unslit. The posterior valve commonly shows two slits but sometimes these are obsolete, so that a shell with the slit formula 0—0—0 is possible. Moreover, interslitting may occur in this valve, while sometimes the seventh valve, rarely the sixth, has one slit on each side though the others are unslit. A series of figures are given to elucidate these features.

We have placed *A. maxillaris* Ashby here, as the description only lays stress upon "a row of exceptionally large milk-white pustules," and the other features suggest this species.

Acanthochiton deliciosus.

(Plate x., fig. 6.)

Acanthochites deliciosus Thiele, Die Fauna Sud-west Aust., iii., 1911, 403. Bunbury, South-west Australia. Type in Berlin Mus.

This species, described from Koombane Bay, South-west Australia, from a very small, probably young, shell, belongs to the *kimberi* series. The sculpture is of coarse granules, the asbestoid girdle tufts characteristic, and the slitting ?—1—2, the anterior valve apparently not having been disarticulated. Examples were collected by Hull at Woody Island, Recherche Archipelago, and King George's Sound, W.A.

The shell is a little less elongate than the normal *A. kimberi;* the pustules are elongate ovals radiating towards the edge; the jugal area is not differentiated but only pitted. Slits 3—1—2.

Dimensions: 3.5 x 1.75 mm. (Type).

Habitat: South-western Australia.

Thiele's figures are reproduced here, while a detailed painting of half of a median valve of one of Hull's specimens appears on plate x., fig. 6, showing very elongated pustules widely separated.

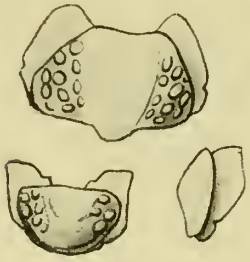

Fig. 1.
A. deliciosus.

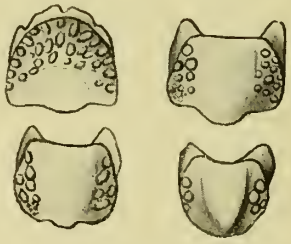

Fig. 2.
A. michaelseni.

ACANTHOCHITON MICHAELSENI.

Cryptoplax michaelseni Thiele, Die Fauna Süd-west Aust., iii., 1911, 404. Sharks Bay, West Australia. Type in Berlin Museum.

This species, described by Thiele under the genus name *Cryptoplax* on account of the lack of slitting of the insertion plates, is apparently the Western Australian representative of the *kimberi* degenerates of the East. Through a misapprehension of the description Ashby has "rediscovered" a *Cryptoplax*, 7 mm. long, from Carnarvon, Western Australia, to which he has applied Thiele's name. The Thielean figures here reproduced absolutely prove that Thiele's species is not a *Cryptoplax* in our usage of the genus. Thiele's shell is distinctly sculptured with small tubercles, the tegmentum similar to that of *Acanthochiton* generally, the dorsal area free from pustules, the mucro posterior, slitting three in the anterior valve only, no slits in the remaining valves. General colouration yellowish brown.

(iv.). ACANTHOCHITON PILSBRYI.

(Plate ix., figs. 31-35.)

Acanthochites pilsbryi Sykes, Proc. Malac. Soc., ii., 1896, 91, pl. vi., f. 6, 6a. Port Phillip, Victoria. Type in Nat. Mus., Melbourne.

Acanthochites maughani Torr & Ashby, Trans. Roy. Soc. S. Aust., xxii., 1898, 218, pl. vii., f. 5. Port Victor, South Australia. Type in coll. Torr. Hedley & Hull, Rec. Aust. Mus., vii., 1909, 265, pl. lxxiv., f. 24-27.

Acanthochiton pilsbryi Ashby, Trans. Roy. Soc. S. Aust., xliii., 1919, 394, pl. xli., f. 1-3.

Acanthochiton pilsbryi maughaneanus Ashby, id. ib., 395, pl. xli., f. 4. Middle Harbour, Sydney, N.S.W. Type in coll. Ashby.

Shell medium, elongate, depressed. Colour reddish fawn to brown, occasionally black.

Anterior valve pustulose, pustules elongate, convex, separate, longer towards edge; apex tending to smoothness, no ribbing present.

Median valves with dorsal area narrow, linear and smooth; transverse growth lines, latero-central areas pustulose, a faint elevation indicating their junction, the pustules on the former radially arranged, on the latter linear, the pustules oblique and touching each other.

Posterior valve large; mucro central; ante-mucronal band as dorsal; remainder of valve pustulose as anterior valve.

Girdle broad in life, contracting and curling when dry to less than one-fourth, covered with rather long spicules; sutural tufts small.

Interior: Bluish or pinkish. Insertion plate of posterior valve short, perpendicular, not sinuate; slits 5—1—2.

Dimensions: 10 x 3.5 mm. (Type).

Station: Under stones in muddy situations below median tide mark.

Habitat: New South Wales (Port Jackson specimen described), Victoria, South Australia, Tasmania.

Remarks: The variation in sculpture cannot be construed geographically, as extremes occur commonly in N.S.W. waters. Ashby has named the N.S.W. form, but none of his characters are constant, and the interior features do not differ at all. The shell, when alive, has a huge girdle which dries up more than that of any other species, consequently no idea of the living shell can be gained from the dried specimens commonly handled. Two figures are given, showing the differences in life and death.

(v.). Series of *A. wilsoni.*

ACANTHOCHITON WILSONI.

(Plate x., fig. 18.)

Acanthochites (*Notoplax*) *wilsoni* Sykes, Proc. Mal. Soc., ii., 1896, 92, pl. vi., f. 2, 2e. Port Phillip, Victoria. Type in Nat. Mus., Melbourne.

Acanthochites verconis Torr & Ashby, Trans. Roy. Soc. S. Aust., xxii., 1898, 217, pl. 7, f. 4. Gulf St. Vincent, South Australia. Type in coll. Torr.

Shell elevated, carinated, side-slopes convex. Colour (of the type) "the ridge marked with bands of reddish and salmon-pink; the lateral areas of a dark red; the pleural areas marked with red and white."

Described and figured by Sykes from Port Phillip, Victoria, the figures being untrustworthy, as in the case of *A. pilsbryi,* described at the same time, in which the pustules are said to be round, and there are no such pustules on the shell. In the present case "sculptured all over with well-marked flattened tubercles" is read and the figure shows these very small and crowded. The dorsal area is elongated, wedge-shaped, marked with both longitudinal and transverse striae. The posterior valve has an elevated and rather pointed mucro at about the posterior third.

Girdle large, densely spiculose. Sykes describes it as showing no visible tufts, but as in the case of its nearest ally *A. purpuratus,* the tufts are doubtless present, but are withdrawn and disappear as the girdle dries or even as it shrinks in alcohol.

Interior whitish, becoming stained with red under the jugal area. Slits 5—1—6.

Dimensions: 25 x 10 mm. (Type), 18 x 10 (figured example, dry and curled).

Station: Under stones below low water mark.

Habitat: Victoria (but not extending round Wilson's Promontory), South Australia.

Remarks: Our figure is of a specimen from McDonnell Bay, South Australia, which agrees well with the author's description, the granules being oval and flattened. Torr and Ashby described (1898) *A. verconis* from Gulf St. Vincent, dredged by Dr. Verco, a specimen 10 x 4 mm., with the pleural area covered with ten to eleven diagonal rows of squamose pustules, the dorsal area striated, the mucro central; slits 5—1—8. This has since been synonymised by the authors, but Hedley's figures of their type do not coincide with those provided by Sykes.

ACANTHOCHITON PURPURATUS.

(Plate x., figs. 15-17.)

Acanthochiton purpuratus Hull, Aust. Zool., iii., 1923, 196, pl. xxvii., f. 2. Betangabe Inlet, near Twofold Bay, New South Wales. Type in Australian Museum.

Superficially resembling *A. wilsoni*, but with the pustules round, convex, and separated; the dorsal area smooth; the posterior valve with the mucro elevated, posterior, and the post-mucronal area concave. Colour purplish-red (ochraceous, flecked with dull red).

Girdle very large, fleshy, dull purple, densely clothed with delicate spicules, and having large sutural tufts which generally disappear as the girdle dries.

Interior white, slits 5—1—10. Insertion plate of anterior valve very long, of median valves large, and of posterior valve large with two side slits, 8-slit between, slits small, but having a long deep groove running to the tegmentum; plate a little produced backward.

Dimensions: 18 x 11 mm. (Type, dried).

Station: Under stones, or in interstices of friable shale, in sheltered pools, below low water mark.

Habitat: New South Wales (Betangabe Inlet, Shellharbour, Port Jackson, and Long Reef, north of Sydney).

vi. Series of *A. crocodilus*.

ACANTHOCHITON CROCODILUS.

(a). ACANTHOCHITON CROCODILUS CROCODILUS.

Acanthochiton crocodilus Torr & Ashby, Trans. Roy. Soc. S. Aust., xxii., 1898, 216, pl. vi., f. 2. Marino, South Australia. Type in coll. Torr.

Shell medium, elongate, depressed. Colour pale olive-green.

Anterior valve strongly five-ribbed, sculptured with triangular pustules with the apices directed forward and outward, small at the apex of the valve, increasing in size towards the margin.

Median valves with broadly triangular dorsal area, each margin of which is deeply notched with three to eight notches; lateral areas distinctly raised with a strongly raised diagonal rib; latero-pleural areas covered with triangular pustules which become very flat and large as they approach the anterior margin.

Posterior valve with mucro median, ante-mucronal area smooth, post-mucronal area concave, sculptured similarly to median valves, but pustules much smaller.

Girdle broad, spongy, densely spiculose and edged with notable long spicules;

short, brownish.

Interior bluish-white; slits 5—1—6; anterior insertion plate long, median sutural laminae large, posterior insertion plate short, terminally perpendicular, thickened, two-slits interslit with three or four notches.

Dimensions: 17 x 8 mm. (Type) dried specimen.

Habitat: South Australia (Marino; Dr. Torr).

Remarks: The authors emphasise the strongly raised diagonal rib (which, however, is not clearly shown in the figure), the very coarse shagreening, and the microscopical striation of the pustules. Although we have not seen specimens from Victoria or Tasmania the range of the species probably extends throughout southern and south-eastern Australia. We separate the New South Wales shell as a subspecies.

(b). Acanthochiton crocodilus debilior, n. sub. sp.
(Plate x., figs. 13, 14.)

Shell generally similar to the preceding, but with the anterior valve five-waved (not ribbed); the latero-pleural areas hardly separated, a diagonal rib being merely indicated; posterior valve with mucro at posterior fourth; sutural tufts long and composed of large spicules. Colour variable, white with a few faint markings chiefly towards the beaks; uniform purple, and dark red are some of the variations observed.

Dimensions: 20.5 x 8.5 mm. (Dried example).

Station: On, under, or at the edge of insertion of stones in sand or mud, below low water mark.

Habitat: New South Wales (Port Jackson, and Shellharbour).

Remarks: This subspecies differs from the South Australian shell in the generally weaker sculpture, and the obsolescence of the ribs on anterior and median valves.

(vii.). Acanthochiton curiosus, n. sp.
(Plate x., figs. 24, 25.)

Shell broadly ovate, flattened. Colour grey-brown.

Sculpture of minute separate circular, convex pustules; dorsal area smooth; posterior valve with mucro at about the posterior third, depressed, post-mucronal slope concave.

Girdle very wide, covered with very fine spicules; sutural tufts white, long, silky.

Interior bluish-white; anterior insertion plate very large, 5-slit; median insertion plates very wide, 1-slit; posterior valve with large sutural laminae, posteriorly 2-slit and irregularly 8-slit between where the plate is calloused and perpendicular.

Dimensions: 21 x 15 mm. (Dried shell).

Station: Under stones lying on dead coral reef at low tide.

Habitat: Armit Island, near Whitsunday Group, Queensland (Type) and other localities northward to Torres Strait. Type in Queensland Museum.

(viii.). Acanthochiton aenigma, n. sp.
(Plate x., figs. 21, 23.)

Shell small, elongate, narrow, elevated, carinated. Colour pale fawn, mottled with reddish-brown.

Anterior valve faintly five-ribbed, the ribs bearing slightly elongate pustules, the sculpture otherwise consisting of circular, separate, convex granules.

Median valves rather elongate; dorsal area wedge-shaped, with margins dentate, smooth, but showing colour lines; latero-pleural areas covered with separated, suboval, convex granules, more massed laterally.

seven sutural tufts on each side and four around the anterior valve, spicules

Posterior valve with apex elevated at posterior third; post-mucronal slope concave, pustules more circular thereon.

Girdle densely finely spiculose, sutural tufts long.

Interior pinkish-white, centre of valves deep pink. Anterior valve with large insertion plate, obscurely five-slit; median valves with large sutural laminae sometimes unslit, valve vii. with 1—1 slits; posterior valve with sutural laminae and insertion plate produced backwards, four-slit, not sinuated.

Dimensions: 11 x 5 mm.

Station: Dredged in 70 fathoms.

Habitat: Off Ulladulla, New South Wales.

Remarks: This is the first fairly deepwater Loricate, other than Lepidopleurids, recorded from the coast of New South Wales. It was taken alive from a block of stone brought up in a trawl by C. W. Mulvey, of the trawling company. Type in the Australian Museum.

(ix.). ACANTHOCHITON SPHENORHYNCHUS, n. sp.

(Plate x., figs. 19, 20.)

Shell rather depressed, broadly oval, subcarinate, dorsal areas narrow. Colour greyish-white, painted with brown spots, blotches and streaks, and suffused jugally with lavender.

Anterior valve showing no undulations, covered with crowded, circular, flat-topped pustules.

Median valve with narrow jugal area, smooth, subcutaneously lined; latero-pleural areas not differentiated, densely pustulose, pustules circular, flat-topped.

Posterior valve with mucro at posterior fourth, post-mucronal slope straight.

The pustules vary a little from circular to oval, those on the post-mucronal area being circular, as are those on the lateral edge of the anterior valve; the remainder of the anterior valve pustules vary towards oval, some are concave, some flat-topped; on the latero-pleural areas those nearest the jugum are concave, while those on the pleural area are flat-topped.

Girdle wide, densely finely spiculose; sutural tufts notable.

Interior white, valves vii. and viii. having central purple spots. Anterior insertion plate large, with five distinct slits; median insertion plate large, 1-slit; posterior insertion plate large, projecting a little backward, 2-slit, sinuate, with seven teeth between slits.

Dimensions: 16 x 8½ mm.

Station: Under stones at low water.

Habitat: Hayman Island, near Port Denison (type) and other Queensland localities to Torres Strait.

Remarks: The type shell was collected by E. H. Rainford; and Hull collected several specimens at the other localities. Type in Queensland Museum.

Genus METUROPLAX.

Meturoplax Pilsbry, Nautilus, vii., 1894, 107. Type by original designation *Acanthochites retrojectus* Pilsbry.

Shell very small, sculpture pustulose, no dorsal area appreciably differentiated, although on that place the pustules are smaller and more crowded, the tail valve very small and insignificant, the mucro terminal and the post-mucronal area retractive, the girdle finely spiculose, the sutural tufts asbestoid and pocketed as in the series of *A. sueurii;* internally anterior valve regularly five-slit, median valves one-slit on each side, posterior valve with two side slits only, the insertion plate thrown strongly forward. Only one species is known, apparently a derivative of the *A. sueurii* group, but now well distinguished.

Meturoplax retrojecta.

(Plate x, figs. 26, 30.)

Acanthochites retrojectus Pilsbry, Nautilus, vii., Jan., 1894, 107. Port Jackson, New South Wales. Type in Acad. Nat. Sci. Philad. Pilsbry, Proc. Acad. Nat. Sci. Philad., May, 1894, 78, pl. ii., f. 12-15.

Acanthochiton retrojectus var. *pustulosus* Ashby, Trans. Roy. Soc. S. Aust., xlvi., 1922, 15. Quarantine Station, Sydney Harbour, N.S.W. Type in coll. Ashby.

Shell small, flattened, round-backed. Colour dark and light green, sometimes black, variously blotched and patched with colour.

Anterior valve rounded, not ribbed, covered with small rounded, separated, convex pustules.

Median valves with dorsal area not differentiated, latero-pleural areas similarly pustulose, pustules larger towards the edge. Although the dorsal area is not separated the pustules are smaller and oval, showing an indistinct trigonal area.

Posterior valve small, mucro elevated, posterior; post-mucronal area retractive, sculptured with minute pustules as on anterior edge, small ante-mucronal wedge showing dorsal sculpture.

Girdle downy, sutural tufts prominent, asbestoid, long and silky.

Interior dark green. Slits 5—1—2.

Dimensions: 9½ x 3½ mm. (Type), 12 x 6 mm. (Paratype in spirit); average dry specimens, 11 x 5 mm.

Station: Generally on the surface of the littoral rocks below median tide mark, in crevices and frequently associated with *Galeolaria caespitosa*, where it accommodates itself to the convolutions of the vermiform shell and, becoming sedentary, suffers greatly from erosion. It is also found below low water mark in the interstices of clusters of the Tunicate "Cunjevoi," on the seaward side of the shore rocks.

Habitat: New South Wales (Port Jackson specimen described), Queensland, eastern Victoria.

Remarks: The sculpture of this shell is very variable amongst examples taken from the same locality; sometimes there are large separated pustules on the latero-pleural areas, in other cases the pustules are small and closely massed. Queensland shells are broader, more regularly pustulose, the pustules well marked on the dorsal area; there is a faint waving on the anterior valve; the posterior valve rather larger. (Examples taken by Hull on Facing Island, Port Curtis, Burnett Heads, and Cooktown, Queensland). Victorian examples show the posterior insertion plate striate between slits.

Genus Notoplax.

Notoplax H. Adams, P.Z.S., 1861, 385. Type by monotypy *Cryptoplax* (*Notoplax*) *speciosa* H. Adams.

Macandrellus Dall, Proc. U.S. Nat. Mus. I., 1878, 299. Type by original designation *Acanthochites costatus* H. Adams & Angas.

? *Mecynoplax* Thiele, Gebiss das Schnecken (Troschel) II., 1892, 393. Type by monotypy *M. acutirostratus* = *Notoplax hilgendorfi* Thiele.

Loboplax Pilsbry, Nautilus vii., 1893, 32. Type by original designation *Chiton violaceus* Quoy & Gaimard.

Shells small to large, elongate oval, tegmentum small, girdle large; coloura-

tion brown to pale red. Sculpture bold, with more or less distinct radials separating the lateral from the pleural areas, and similar radials on end valves, sometimes obsolete, at others very prominent: dorsal area represented by a linear ridge, girdle always very broad, sometimes leathery with only sutural tufts present, while others are so densely spiculose that the sutural tufts are difficult to distinguish: insertion plates very large, posterior valve many slit.

The inclusion of *Macandrellus* and *Loboplax* as synonyms is necessary, as though the types of these groups look at first sight distinct, every gradation is found, so that the names cannot be utilised even in a sectional sense. The second Neozelanic species of *"Loboplax"* has a girdle like that of *"Macandrellus,"* thought its specific distinction from *violaceus* is still in question. On the other hand immature specimens of true *Notoplax* can scarcely be differentiated from shells of *"Macandrellus."*

There is a tendency throughout the series of forward movement in the insertion plate of the posterior valve: this is clearly seen in the Australian *gabrieli*, more noticeable in the Lord Howe Island *leuconotus*, and exaggerated in the New Caledonian *tridacna*: the same movement is seen in members of the *speciosa* series, but the extremes have not yet been found.

It is somewhat difficult to express the differences in key form, but the characters may be abbreviated as follows:—

Girdle thickly spiculose:

Spicules delicate like silk .. .. *speciosa.*
Anterior valve ribbed .. .. *glauerti.*
Pustules larger, girdle like plush .. .. *macandrewi.*
Spicules coarse and glassy .. .. *subspeciosa.*

Girdle sparsely covered with spinelets, sutural tufts prominent:

Dorsal area pitted .. .. *gabrieli.*
smooth posteriorly pitted .. .. *subviridis.*
smooth:
General sculpture fine with fine radials .. .. *costata.*
coarse with coarse radials .. .. *extra.*
less coarse with bolder radials .. .. *rubrostrata.*

Series of *N. speciosa.*

Shell large, valves very narrow, elongate, girdle very broad, densely spiculose.

Colour varied, tegmentum of red brown varying to yellow or dark brown. Anterior valve small, semicircular, ribbed either prominently or ribs obsolete, pustulose.

Median valves with narrow smooth dorsal area, lateropleural areas generally separated by a ray of larger pustules which vary in size and shape.

Posterior valve large, mucro practically terminal, elevated, post-mucronal slope steep.

Girdle densely spiculose but spicules varying in size, and sutural tufts rarely prominent though generally distinguishable.

Interior varying from white to pink or green.

Insertion plates very large, those of anterior strongly thrown forward, median ones like wings, and that of posterior valve long and nearly perpendicular.

Notoplax speciosa.

(Pl. xii., fig. 3.)

Cryptoplax (*Notoplax*) *speciosa* H. Adams, P.Z.S., 1861, 385. Tasmania. Type in Brit. Mus.

Acanthochites (*Notoplax*) *speciosus* Pilsbry, Man. Conch., xv., 1893, 32, pl. i., figs. 23-26 (from type). Proc. Acad. Nat. Sci. Philad., 1894, 83, pl. iv., figs. 31-33 (from St. Vincent Gulf, S.A.).

Acanthochiton (*Notoplax*) *spongialis* Ashby, Journ. Roy. Soc. West Austr., x., 1923, 13, pl. l. D'Entrecasteaux Channel, South Tas. Type in coll. Ashby.

Acanthochiton speciosus May, Illustr. Index Tasm. Shells, 1923, pl. xvi., f. 2.

The large size and massive spiculose girdle make this species distinctive, the spicules being long, thin and delicate. The pustules on the anterior valve are round and flattopped, the radial ribbing being represented only by larger elongated pustules; similarly the pustules of the median valves are smaller and rounder towards the beaks, larger and more oval towards edges: the lateropleural rib is formed of larger semiconfluent oval pustules limiting a small lateral area. The posterior valve has no ribbing behind the mucro. Interior pinkish white.

Dimensions: 72 x 24 mm. (Type): 38 x 18 mm., 42 x 21 mm.

Station: Dredged in shallow water, generally living in sponges.

Habitat: New South Wales, Victoria, Tasmania, South Australia.

Remarks: We figure a valve from shell sand Long Bay, New South Wales, which we attribute to this species, though recovery of the entire shell may show characters for separation. The South Australian shell dredged by Verco and figured by Pilsbry differs from the Tasmanian form in the shape of the posterior valve and other minor differences, and may be called *Notoplax speciosa addenda nov.*

Notoplax rubrostrata.

Acanthochites rubrostratus Torr, Trans. Roy Soc. S.A., xxxvi., 1913, 169, pl. vii., figs. 7a-f. St. Francis Island and Henley Beach, S.A. Type in coll. Torr.

In the original description this species was contrasted only with *speciosa,* and Ashby regards it as the South Australian representative of that species. The anterior valve is distinctly five ribbed, while the latero-pleural areas are separated by a well-marked rib, but there is no ribbing on the post-mucronal area. Torr described the girdle as "leathery covered with minute spinelets, having long silky tufts at the sutures," while Ashby states the spicules are coarse. As the type dimensions are only 11 x 6 mm. we cannot exactly determine this form.

Notoplax glauerti.

Acanthochiton spongialis glauerti Ashby, Journ. Roy. Soc. West Austr., x., 1923, 14, pl. i., f. 2. Cottesloe, Perth, W.A.

This is the Westralian representative of *N. speciosa,*—Ashby's *spongialis* being an exact synonym of the typical *speciosa,*—apparently differing in the ribbing of the end valves, *glauerti* being recorded as having five ribs on the anterior valve, and six ribs behind the mucro on the posterior valve. Ashby's figures are curious, but not illuminating.

Dimensions: 17 x 8 mm. (Type).

Station: In sponge.

Habitat: West Australia.

NOTOPLAX SUBSPECIOSA, n.sp.

(Plate xii., fig. 2; pl. xi., fig. 14.)

This species differs from typical *N. speciosa* in the character of the girdle spicules which are large and thick. The pustulation is more elongate and there rarely appears any ribbing on the lateral areas nor on the post-mucronal slope of the posterior valve.

Dimensions: 32 x 12 mm. 26 x 11 mm. (Type).

Station: Under stones below low water mark.

Habitat: Port Arthur, South Tasmania (Type). Port Lincoln, S.A.

Remarks: Ashby separated a Tasmanian species as *A. spongialis* comparing it with *A. speciosa.* Probably the species here named was regarded by Ashby as *speciosa,* but unfortunately the series used by Ashby for his types of *spongialis* were the identical ones Iredale had compared with the type of *speciosa* in the British Museum, May having sent them to him for that purpose. Type in Australian Museum.

NOTOPLAX MACANDREWI, n.sp.

(Plate xi., figs. 4, 7, 10, 13; Plate xii., fig. 1.)

The beautiful broad girdle with silky spicules, resembling a piece of plush, makes this species one of the most striking of the order. The shell is very small in proportion to the girdle and the whole facies suggests its alliance with the *speciosa* series, though at first sight it recalls *costata.* The pustules are comparatively larger than those of *speciosa,* obsolete radials on the anterior valve, a suggestion of a lateropleural rib, but no ribs on the posterior valve. The mucro is posterior, but the post-mucronal slope is slightly slanting. The colouration of the shell is rose-red to yellowish red, the girdle silvery.

Interior pink.

Dimensions: 17 x 10 mm. Type.

Station: Under stones below low water mark.

Habitat: Shellharbour, New South Wales.

Remarks: We have great pleasure in naming this species after Mr. G. McAndrew, of Shellharbour, whose intensive collecting in the type locality has added so much to our material. Type in Australian Museum.

Series of *N. costata.*

Shell small, valves narrow, elongate, girdle very broad, finely spiculose with sutural tufts prominent.

Colouration of various tones from brick to orange.

Anterior valve generally five ribbed, otherwise much as in *speciosa.*

Median valves with linear dorsal area and lateral areas well distinguished by a nodulose rib: sculpture throughout of elevated nodules of varying shapes and sizes.

Posterior valve with mucro posterior, generally elevated, post-mucronal area small and generally ribbed.

Girdle varying from almost leathery to somewhat closely spiculose.

Interior generally pinkish white.

Insertion plates of anterior and median valves large, but that of posterior valve comparatively smaller with a strong suggestion of forward throwing.

Notoplax costata.

(Plate xi., figs. 1, 5, 8, 11, 14.)

Acanthochites costatus H. Adams & Angas, P.Z.S., 1864, 194. Sydney, N.S.W. Type in Brit. Mus. Pilsbry, Man. Conch., xv., 1893, 40, pl. 3, fig. 74.
Acanthochiton costata May, Illustr. Index Tasm. Shells, 1923, pl. xv., f. 14.

In this, the first described form, the anterior valve is notably five ribbed, the general pustulose character of the shell being small flat topped ovals. The dorsal area is smooth, the lateropleural rib is well marked, while the posterior valve has the mucro at posterior third, the post-mucronal area five ribbed.

Girdle minutely spiculose, sutural tufts of large spicules prominent.

Interior pinkish white. Slits 5—1—6, posterior plate nearly vertical.

Dimensions: 18 x 7 mm. (Type).

Habitat: New South Wales, Victoria, Tasmania, South Australia.

Remarks: This species is replaced in southern Queensland by a distinct species, *gabrieli*, but ranges into South Tasmania and even to South Australia.

Specimens from Port Arthur, S. Tasmania, are larger with small crowded rounded pustules, a little larger than those of typical shells, and may be called *Notoplax costata tasmanica* nov. Type: 24 x 10 mm.

A specimen from Port Lincoln, South Australia, collected by Dr. W. G. Torr, differs in less pronounced pustules on the pleural areas, but stronger more nodulose ribs, the posterior valve with the mucro more depressed, the post-mucronal area indistinctly noduled, the anterior ribbing distinct, the nodules separate, the dorsal area smooth.

Notoplax subviridis.

Acanthochites subviridis Torr, Trans. Roy. Soc. S.A., xxv., 1911, 104, pl. xxv., figs. 3a-f. Rabbit Island, Albany, South-west Austr. Type in coll. Torr.

This is undoubtedly the Westralian representative of the *costata* series: the anterior valve is strongly five ribbed, the elongate nodules coalescing, the pustules between the ribs being almost circular: the lateral areas have strong ribs, and the post-mucronal area is strongly ribbed: the mucro posterior, the slope perpendicular, the pustules oval, flattened, concave topped, touching but not overlapping: all insertion plates very long: the dorsal area has the posterior portion pitted, the anterior smooth: the girdle leathery, the sutural tufts long and silky.

Dimensions: 22 x 12 mm. (Type).

Station: Under stones below low water mark.

Habitat: South-western Australia.

Notoplax gabrieli.

(Plate xi., figs. 3, 6, 9, 12, 15.)

Acanthochiton (*Notoplax*) *gabrieli* Ashby, Trans. Roy. Soc. S.A., xlvi., 1922, 10, pl. iii., fig. 3 (pessime). Caloundra, Queensland. Type in coll. Gatliff.

This species differs at sight in the pitting of the dorsal area; the pustules are rounder, convex: the lateropleural diagonal rib consists of connected rounded pustules, the lateral area raised: the mucro is terminal, little elevated, the post-mucronal slope with a slight forward tilt, showing no ribbing.

Girdle leathery, wide, with notable sutural tufts.

Internal features diagnostic: anterior insertion plates smaller: median plates less expanded, posterior plate slightly protractive, striate.

Dimensions: That of type not given. 26 x 13 mm. (dried). Specimen figured from same lot as type.

Station: Under stones between tide marks.

Habitat: Southern Queensland.

NOTOPLAX EXTRA, n.sp.

(Plate xi., fig. 2.)

In this species the very strong oval pustulation of the pleural areas is diagnostic: the rihhing on the anterior and posterior valves, as well as the latero-pleural rib are strongly nodulose, the oval nodules showing a strong tendency to coalesce into a solid line: the median valves are more narrowed anteriorly and more attenuate than those of the preceding forms, while the girdle covering consists of short fine spicules like felt, the sutural tufts prominent. Sometimes the dorsal area, which is smooth, is coloured differently, e.g., plum, the general colouration being rose. Dimensions: 22 x 7 mm.

Station: Below low water mark.

Hahitat: Southern Tasmania (Port Arthur). Type in Australian Museum.

NOTOPLAX MAYI.

(Plate xii., fig. 4.)

Acanthochiton mayi Ashhy, Trans. Roy. Soc. S.A., xlvi., 1922, 12, pl. iii., figs. 1a-h. Dredged 100 fathoms off Cape Pillar, Tasmania. Type in Hobart Mus.

This species was named by Ashby from valves dredged, hut as only median valves are known, the correct location of the species is indefinite.

The valve here figured was dredged in 80 fathoms, 22 miles east of Narrabeen, and agrees very closely with a co-type of Ashby's species in the Australian Museum, hut is larger, the valve heing 7 x 7 mm. As the shape suggests affinity with *speciosa,* if it followed the same proportions, the whole shell might reach a length of 60 mm. with a breadth of 20-30 mm., a fine species. It is easily distinguished from any other species hy the coarse pustules, the striate beaks of the otherwise smooth dorsal area and the form of the tegmentum.

Genus GLYPTELASMA, n.gen.

An extraordinary development paralleling that of the Ischnochitonid group, *Stenochiton,* is that of the series here named *Glyptelasma, Acanthochites matthewsi* Pilshry heing the type. The whole shell is elongate, the girdle wide and leathery, faintly spiculose, sutural tufts small. the surface of the shell shows a linear sculpture, only granulose near heaks of median valves in some cases: the internal features resemhle those of *Notoplax.* This peculiar Adelaidean development may he regarded as an offshoot of the pre-*Notoplax* stem, the internal features having altered little, though the sculpture has developed so that it is now the most specialised in the whole group of the CRYPTOCONCHIDAE and CRYPTOPLACIDAE.

The two known species are easily separated as the lateral areas of the second species, *glypta,* are smooth and unsculptured, while the sculpture on the pleural areas is reduced to a few cuts.

GLYPTELASMA MATTHEWSI.

(a). GLYPTELASMA MATTHEWSI MATTHEWSI.

(Plate xi., figs. 17, 19, 21, 22.)

Acanthochites matthewsi Pilshry, Nautilus, vii., 1894, 120 (ex Bednall & Pilshry MS.). South Australia = Yorke's Peninsula fide E. H. Matthews, Nautilus,

ix., 189, 72. Type lost.

Acanthochites (*Notoplax ?*) *matthewsi* Pilsbry, Proc. Acad. Nat. Sci. Phila., 1894, 83, pl. iv., figs. 27-30.

Notoplax porcina Ashby, Trans. Roy. Soc. S.A., xliii., 1919, 395, pl. xli., figs. 7-10. Gulf St. Vincent, S.A. (dredged). Type in coll. Torr.

Shell medium, elongate, a little elevated, valves keeled, anterior valve faintly five waved, posterior valve large, girdle leathery, sutural tufts small.

Colour greenish white, waved irregularly longitudinally with zig zag lines of darker green.

Anterior valve apically minutely pustulose, pustules massing into irregular wavy zig zagging lines.

Median valve with long narrow triangular dorsal area almost smooth, but showing faint grooving anteriorly: lateropleural areas sculptured with longitudinal lines parallel to jugum becoming broken into pustules towards beak and on lateral area which is indicated by a slight elevation: some valves show pustules on entire lateral area, while in others these have become obsolete and one of the latter cases was described by Ashby under the name *porcina* (type examined).

Posterior valve with mucro elevated at posterior third, post-mucronal area concave below mucro and thence flattened, covered with small rounded pustules, remainder of valve as median sculpture.

Girdle large, leathery, with fine spicules present and sutural tufts of small silky spines.

Interior bluish white. Slits 5—1—6.

Dimensions of lost type: 26 x 8 mm. (dried). Neotype, 14 x 5 mm. (dried). *porcina*: 35 x 11 mm.

Station: Below low water and dredged.

Habitat: South Australia, Victoria.

Remarks: The type was unfortunately lost in transit after Pilsbry's figures were drawn: the neotype figured is from the type locality.

(b). Glyptelasma matthewsi occidentalis, n.subsp.

(Plate xi., figs. 18, 20.)

The West Australian shells, collected by Hull at Middleton Beach, King George Sound, differ subspecifically in the more crowded linear sculpture of the median valves and their notably more slanting direction: the pustulose area is restricted to the central portion of the pleural areas, but the interstices of the ribs being scratched more extensive nodulation is apparently seen. The jugal area is broader and the lines number twenty, whereas in the typical form they only number thirteen in the same sized shell. The anterior valve has distinct V wrinkling between the linear radials, whereas the typical form shows uninterrupted wavy wrinkling.

Dimensions: 21 x 9 mm.

Station: Under stones below low water mark.

Habitat: South-west Australia. Type in Western Australian Museum.

Glyptelasma glypta.

(Plate xi., fig. 23.)

Acanthochites (*Notoplax*) *glyptus* Sykes, Proc. Mal. Soc., ii., 1896, 92, pl. vi., figs. 5, 5a. Port Phillip, Victoria. Type in Nat. Mus., Melbourne.

This species is readily recognised by its complete lack of nodular sculpture, the whole shell being smooth save for a few slanting cuts on the pleural areas: the lateral areas are slightly raised but no dividing rib. The anterior valve is similarly five waved, the elevations scarcely distinguishable: dorsal area not differentiated: the mucro elevated at about posterior fourth, the post-mucronal area a little excavate.

Girdle leathery, tufts small and inconspicuous.

Interior white. Slitting 5—1—6.

Dimensions: 22 x 7 mm. (Type).

Station: Dredged.

Habitat: Victoria.

Remarks: The specimen figured was kindly loaned to us by Mr. C. J. Gabriel.

Genus Craspedoplax, n.gen.

This genus is introduced, with type, *Hanleya variabilis* A. Adams & Angas. This is a peculiar form showing many differences from the normal *Acanthochitonids*, the anterior insertion plate, though five-slit, being short and *Ischnochitonoid* in appearance, the median valves showing sutural laminae sometimes large but comparatively small for the family, while the insertion plate of the posterior valve is small, somewhat irregularly 6-10 slit and with age disappearing, a callus ridge not unlike that of a *Poneroplax* or *Onithochiton* developing. The radula was examiued by Thiele, who classed the type species under *Loboplax,* a group very unlike in every other feature. The girdle shows the usual sutural tufts, but scale-like spicules otherwise cover it. It appears to be more closely related to *Craspedochiton,* but differs from that group in habitat, girdle features and apparently also in the radula. The species may be recognised superficially.

Shell broad to medium, low .. .. *variabilis.*

Narrow, elevated, pleural areas coarsely sculptured .. .. *cornuta.*

Narrow, elevated, pleural areas finely sculptured .. .. *elegans.*

Craspedoplax variabilis.

(Plate xi., figs. 29-34.)

Hanleya variabilis H. Adams & Angas, P.Z.S., 1864, 194. Yorke Peninsula, South Australia. Type lost.

Acanthochites (*Loboplax*) *variabilis* Bednall, Proc. Mal. Soc. ii., 1897, 156.

Acanthochites rufus Torr, Trans. Roy. Soc. S.A., xxxvi., 1912, 167, pl. vi., figs. 4a-f. Kangaroo Island, South Australia.

Loboplax variabilis Thiele, Revision Chitonen, 1910, 72, pl. vii., figs. 9, 10, 11.

Shell small, depressed, broadly ovate to elongate oval, girdle scaly with small sutural tufts of spicules.

Colour green, varied with yellow or white: black: black and white: red, etc.

Anterior valve broad and shallow, pustulose throughout, five indistinct waves being generally discernible: pustules small and round.

Median valve with triangular dorsal area showing longitudinal lines of small elongate pustules: the lateropleural area showing different series of pustules: those on the lateral area, which is very small and slightly raised, small and massed, those on the pleural areas larger slanting ovals arranged in irregular longitudinal series: this arrangement is very pronounced in some juveniles and is altogether obsolete in most adults which then show practically a uniform pustulose surface.

Posterior valve with the mucro post central, the post-mucronal area flattened, the ante-mucronal wedge indistinct, otherwise pustulose.

Girdle finely scaly with small sutural tufts of glassy spicules.

Interior greenish to white. Slitting 5—1—10 to 0.

Dimensions: 16 x 10 mm. (Type). 10 x 5 mm. (*rufus*). 13 x 7½ mm. Specimen figured.

Station: Between tide marks, generally associated with calcareous algae.

Habitat: Queensland, New South Wales, Victoria, Tasmania, South Australia. South-west Australia.

Remarks: This species from the type locality, the specimen figured may be regarded as the neotype, is a large broad shell, the name *variabilis* being very pertinent; the New South Wales shells are much smaller, comparatively longer and narrower, more elevated, while the pustulation is more regular and may be called *Craspedoplax variabilis cambrica*, n.subsp., the North Queensland shells are still smaller with notably coarse pustules and may be distinguished as *Craspedoplax variabilis diminuta*, n.subsp.

Craspedoplax cornuta.

(Plate xi., fig. 39.)

Acanthochites cornutus Torr & Ashby, Trans. Roy. Soc. S.A., xxii., 1898, 217, pl. 6, fig. 3. Marino, S.A. Type in coll. Torr.

Acanthochites exilis Torr & Ashby, Trans. Roy. Soc. S.A., xxii., 1898, 218, pl. 7, fig. 6. Gulf St. Vincent, S.A. Type in coll. Torr.

Acanthochites cornutus Ashby, Trans. Roy. Soc. S.A., xlvi., 1922, 17.

Shell small, elevated, semikeeled, dorsal area trigonal, girdle minutely scaly with prominent sutural tufts.

Colouration yellowish green marbled with greenish white.

Anterior valve semicircular, covered with small rounded pustules and obsoletely waved with five undulations.

Median valves with dorsal trigonal area longitudinally striate and separated from the lateropleural areas by a series of longitudinal pits, generally five in number: the lateral area is differentiated by a slight wave, small in extent, and minutely pustulose: the pleural areas are covered with much larger pustules arranged longitudinally, from ten to twelve rows being counted on each side.

Posterior valve with elevated posterior mucro, the post-mucronal area a little concave below the mucro, sculpture similar to that of other valves.

Girdle scaly, sutural tufts with few long spicules present.

Interior white. Slitting 5—1—6, side slit very low.

Dimensions: 8 x 3 mm. Type: 3 x 1 mm. (type of *exilis*): 8 x 3.5. Specimen figured.

Station: Dredged.

Habitat: South Australia, Victoria.

Remarks: Ashby has affirmed that the two species Torr & Ashby described at the same time are synonymous, and has named a specimen dredged at Sorrento, Victoria, by Mr. C. J. Gabriel as conspecific. From the lastnamed specimen, kindly loaned to us by Mr. Gabriel, our description and figure have been prepared.

Craspedoplax elegans, n.sp.

(Plate xi., figs. 35-38.)

Shell small, elongate, elevated, carinate, girdle scaly, tufts prominent.

Colouration pinky grey with scarlet blotches at times, otherwise mottled.

Anterior valve obsoletely rayed with larger pustules, the pustulation being minute elongate ovals, flattened but convex topped.

Median valves with dorsal area narrowly cuneate flanged with ditches and minutely pitted; the lateral areas small, slightly raised but not differentiated in the character of the pustules which are somewhat irregular small convex ovals radiating outwards on the pleural areas.

Posterior valve with an elevated posterior mucro at about the posterior third, post-mucronal slope straigbt.

Girdle minutely scaly witb small sutural tufts of glassy spicules.

Interior greenish wbite with dark green median blotches. Slitting 5—1—6. Plates small, delicately striate, median slit very low down.

Dimensions: 8.5 x 4 mm.

Station: Under stones between tide marks.

Habitat: Howick Island, Queensland. (Type). North Head, Bowen, North Queensland. Type in Queensland Museum.

Genus Craspedochiton.

Craspedochiton Shuttleworth, Mittheil. Naturf. Gesell. Berne, 1853, 67. Type by monotypy *Chiton laqueatus* Sowerby.

Angasia Dall, Proc. U.S. Nat. Mus., 1881, pp. 283, 286, 289, 290 (1882). ? *Nom. nud.* Type by original designation *A. tetrica* Cpr., Ceylon (not described).

Angasia Pilsbry, Man. Conch., xiv., 1893, 286. Type by monotypy *A. tetrica* Cpr. MS., Ceylon, pl. 61, figs. 27-32.

Not *Angasia* Wbite, P.Z.S., 1863, 498.

Spongiochiton Dall, Pro. U.S. Nat. Mus., 1881, pp. 283, 286 (1882). ? Indeterminate. Type by monotypy, *S. productus* Cpr. (not described).

Spongiochiton Pilsbry, Man. Conch., xiv., 1892, 26, xv., 1893, 35, pl. 1, figs. 14-22. (*A. carpenteri*) fide Iredale, Proc. Mal. Soc., ix., 1910, 100.

Phacellozona Pilsbry, Nautilus, vii., 1893, 139: new name for *Angasia* supra.

Thaumastochiton Thiele, Revision Chitonen, 1909, 34. Type by monotypy *Craspedochiton* (*Thaumastochiton*) *mobiusi* Thiele.

An Indo-Pacific group of many names, but few specimens, most of which have been dredged. The notable feature is the anterior production of the girdle and the degeneration of the posterior insertion plate. Thus through the anterior production of the girdle the anterior insertion plate is very long, almost as long as that of *Notoplax,* whereas that of the posterior valve is small and many slit, being reduced to a callus in the subgenus *Thaumastochiton.*

The animal is small, resembling in this respect, that of *Loricella.* The specific characters given below apply generally as the species are not well differentiated. The type species was described from the Philippines, and *Angasia tetrica* from Ceylon, but a variety *calculosa* of the latter was distinguished from the Philippines, the latter being the typical species. Reeve had described *Chiton petasus* (P.Z.S., 1847, 25, Conch. Icon., iv., 1847, pl. xxvi., fig. 112) from N. W. Celebes, and this form was later redescribed by Nierstrasz as *Craspedochiton tessellatus* (Siboga Exped. Monog., xlviii., 1905).

Though Ashby separated the Australian form from that of the Philippines, he did not compare it with Reeve's and Nierstrasz's species with which it may be identical.

Craspedochiton jaubertensis.

Craspedochiton jaubertensis Ashby, Trans. Roy. Soc. S.A., xlviii., 1924, 326, pl. xxxi., figs. 5a, b, c. Off Cape Jaubert, North-west Austr., 70 feet. Type

in coll. Ashby.

Craspedochiton laqueatus Sowerby, Odhner. Kungl. Svenska. Vetensk. Handl., Bd., 52, 1917, 70. Same specimens.

Shell small, tegmentum normal, girdle wide, produced anteriorly and narrowed posteriorly, shell slightly elevate, semicarinate.

Colour rosepink throughout, blotched sometimes with white.

Anterior valve five ribbed, ribs composed of larger pustules running into each other, the whole of the valve covered with pustules of various sizes and shapes, mostly circular but some oval, all convex topped.

Median valves with dorsal area smooth, that of the first median valve triangular bounded by a rib, the pleural areas being separated by a rib from the lateral areas which are notably elevated: the succeeding median valves do not show the dorsal boundary rib: the pustules on the pleural areas are small convex ovals arranged in about ten longitudinal rows on each side, the lateral areas showing two elevated rows of larger pustules with a few smaller ones between.

Posterior valve with the mucro flattened, a little before the middle, the post-mucronal slope depressed, tuberculose, smaller towards the dorsal area.

Girdle leathery with a few glassy spicules showing at sutural pores.

Interior white, deep rose medially. Slits 5—1—9, festooned.

Dimensions: 36 x 22 mm. (Ashby). Odhner, 27.5 x 18 mm. Specimen figured, 20 x 12 mm.

Station: Shallow water, generally dredged.

Habitat: Tropical Northern Australia from Cape Jaubert, North-west Australia to Cape York, Queensland. Abrolhos, W.A.

Remarks: The whole specimen figured is from Torres Straits, and agrees with shells received from Odhner, part of the lot whence Ashby described his species. One of the latter provided the dissected drawings.

Genus Choriplax.

Choriplax Pilsbry, Nautilus, vii., 1894, 139: new name for *Microplax* H. Adams & Angas.

Microplax H. Adams & Angas, P.Z.S., 1864, 194. Type by monotypy *M. grayi* H. Adams & Angas.

Not *Microplax* Fieber, Europ. Hemipt., 1861, 53.

This peculiar group is only known by two specimens, one from Port Jackson, the other from South Australia. The similarity of the species to those of *Leptoplax* may be only superficial, while its relationship to *Cryptoconchus* is very distant, and it belongs to a different suborder to *Katharina* and *Amicula*. While we regard *Choriplax* as a member of the *Cryptoconchidae*, *Katharina* belongs to the family *Mopaliidae* as Thiele's studies effectually decided.

Shell elongate, thin, delicate, girdle horny. Tegmentum reduced to a very small more or less circular patch: articulamentum large, sutural laminae very small, unslit.

Choriplax grayi.

(a). Choriplax grayi grayi.

(Plate xi., figs. 24-27.)

Microplax grayi H. Adams & Angas. P.Z.S., 1864, 194. Sydney Harbour. Type in British Museum.

Microplax grayi Angas, P.Z.S., 1865, 58, pl. 11, fig. 16. P.Z.S., 1867, 224.

Microplax grayi Pilsbry, Man. Conch., xiv., 1892, 21, pl. 6, figs. 9-11.

Shell elongated, convex, brown: exposed portion of the valves minute, wide heart shaped, carinated, strongly granulated, the intervals between the exposed

parts of the valves about as long as the latter. Lateral areas defined by a distinct rib. Girdle moderate, corneous, smooth. Length, 13; width, 5 mm.

There is little to add to the original description as this typical form has not been met with since: it is quite transparent, looking like thin horn, very elevated: the exposed parts of the valves measure 1.5 to 1.75 mm. We have reproduced the figures drawn by E. A. Smith from the type and the species will be readily recognised when re-discovered.

(h). Choriplax grayi pattisoni.

(Plate xi., fig. 28.)

Choriplax grayi pattisoni Ashby, Trans. Roy. Soc., S.A., xlv., 1921, 137, pl. ix., figs. 1a-c. Near Cape Banks Lighthouse, S.A. Type in coll. Pattison.

A specimen from S.A. generally agreeing with the preceding was separated subspecifically and this may be granted until more material is secured. Length,

Family Cryptoplacidae.

18 x 8.5 mm.: exposed portion of valves with a maximum of 1.5 mm. in breadth by 1 mm. in length. Ashby regarded as the sutural laminae the articulamentum of Carpenter, and later reported that the type of *grayi* was very much longer and narrower in proportion, but the measurements deny this, and the specimens have not been compared together.

This family comprises a series which appear specialised relatives of the preceding, but as the species are now well distinguished and are known from the Tertiary Beds of Australia in the same advanced state, we allow the family distinction.

The members are all elongate, worm-like Loricates with a narrow shell embedded in a huge fleshy girdle which is densely spiculose. The juveniles of all species have the valves in contact but as they grow the valves become separated, and in some cases do not increase in size, so that the valves are comparatively larger in the former state. There is a strong tendency to absolute diminution of the valves so that almost a valveless form may yet be found. The nearest approach is one that insinuates itself into coral blocks and the valves are very minute and widely separated: this form probably occurs in Australian waters, but has not yet been recovered. The girdle shows small sutural tufts, but these are not always superficially visible, but are more prominent in life.

The internal features are characteristic: the anterior insertion plate is large, generally three slit, the slits with an inclination to become lost, the median valves with large sutural laminae, but with no slits, the posterior valve with an unslit insertion plate, sometimes thrown backward, but generally with a strong forward direction.

The external sculpture is granulose, sometimes the granules forming chains of lozenges, at others massing into irregular lines, the dorsal area linear, narrow, smooth, the lateropleural areas united and indistinguishable; the mucro of the posterior valve practically terminal, often absolutely so. In shape the first valve is circular, generally more than a semicircle, the second valve is irregularly orbicular, the third roundly oval, the remainder elongate ovals.

Genus Cryptoplax.

Cryptoplax Blainville, Dict. Sci. Nat. (Levrault), xii., 1818, 124. Type by subsequent designation, Haddon Chall. Rep., xv., 1886, 37 *Chiton larvaeformis* Burrow.

Chitonellus Lamarck, Hist. Nat. Anim. s. Verteb., vi., pt. 1. 1819, 316. Type by

tautonymy *C. laevis* = *Chiton chitonellus* Blainville, 1825 = *Chiton larvaeformis* Burrow.

Oscabrella Broderip, British Cyclopaedia, ii., 1836, 31 (as of Lamarck). Type by monotypy *Chitonellus laevis* Lamarck.

Chitoniscus Herrmannsen, Index Generum Malacoz., 1846, 225. New name for *Chitonellus* Lamarck.

Ametrogephyrus, Phaenochiton and *Dichachiton* Middendorff, Mem. Sci. Nat. Acad. Imp. Sci. St. Petersb., vi., 1847, 97, Feb., 1848. Type by present designation *Chiton larvaeformis* Burrow.

As there is only one genus in the Family the characters given need not be restated: for many years attempts were made to distinguish two genera by means of the presence or absence of sutural pores and tufts, but it is now known that no importance is attachable to the presence or apparent absence of these pores. The girdle spicules vary in size, according to age, while little essential variation in the different species can be determined: the sculpture varies appreciably, and in the most restricted species, such as *mystica,* two series may be separated, one with longer, narrower valves, the other with shorter, broader, valves, the shells showing similar differences in sculpture so that sexual variation is suggested. In the juveniles the posterior insertion plate is a little backward or perpendicular, even when the adult shows strong forward movement, and the slitting in the anterior valve is generally more pronounced and suggestive of five slits.

Measurements of animals, dried or in spirits, are practically valueless as though Pilsbry noted that those of "mummies" were seemingly useless, these animals can contract or expand in life and die in any state so that spirit specimens show all the faults seen in dried ones.

A guide to the species is here presented:

Valves scarcely disconnected:
- Sculpture of lozenge shaped nodules .. .. *mystica.*
- Sculpture nodules coarser: shell smaller .. .. *torresiana.*

Valves (posterior) disconnected:

Sixth valve large.
- Spicules coarse .. .. *striata.*
- Spicules very fine .. .. *iredalei.*

Sixth valve small.
- Posterior insertion plate thrown forward .. .. *larvaeformis.*
- Posterior insertion plate straight .. .. *royana.*

All valves small.
- Spicules short and stout .. .. *burrowi.*
- Spicules longer and finer .. .. *hartmeyeri.*

Cryptoplax larvaeformis.

(Plate xii., figs. 5, 10, 17, 25, 28, 35.)

Chiton larvaeformis Burrow, Elements Conchology, 1815, 191, pl. xxviii., figs. 2-4. No loc. Type in British Museum.

Cryptoconchus larvaeformis id. ib., 190, ex Blainville, MS., n.n.

Cryptoplax larviformis Blainville, Dict. Sci. Nat. (Levrault), xii., 1818, 124.

Chitonellus laevis Lamarck, Hist. Anim. s. Verteb., vi., pt. 1, 1819, 317. New Holland (Peron & Lesueur). Type in Paris Mus.

Chiton chitonellus Sowerby, Genera Recent and Fossil Shells, pt. xii., 1823, pl. 139, new name for *Chitonellus laevis* Lamarck.

Chiton eruciformis Sowerby, id. ib., text to pl. 139, new name for *Chitonellus laevis,* Lamarck.

Chiton chitonellus Blainville, Dict. Sci. Nat. (Levrault), xxxvi., 1825, 550, new name for *C. laevis* Lamarck.

Chiton laevis Blainville, Manuel Malac., 1825, 603, pl. 87, fig. 5 (Lamarck's type figured).

Chiton larvaeformis Blainville, id. ib., fig. 6 (Prob. Péron spec.).

Chiton vermiformis Blainville, Dict. Sci. Nat. (Levrault), xxxvi., 1825, 553, new name for *C. larvaeformis* Burrow.

Chiton fasciatus Quoy & Gaimard, Voy. de l'Astrol Zool., iii., 1835, 408, pl. 73, figs. 21-29. Tonga Tabu. Type in Paris Mus.

Chiton oculatus Quoy & Gaimard, id. ib., 410, pl. 73, figs. 37-38. New Guinea or Vanikoro. Type in Paris Mus.

Chitonellus fasciatus Reeve, Conch. Syst., ii., 1842, 13, pl. cxxxv., figs. 3, 4, 5. Philippines.

Cryptoplax fasciata Brazier, Proc. Linn. Soc. N.S.W., ii., 1877, 75. Darnley I., Torres St.

Cryptoplar oculata ? Brazier, id. ib., 75. Sue I., Torres St.

Cryptoplax montanoi Rochebrune, Bull. Soc. Philom. Paris, Ser. 7, vi., 1882, 190. Borneo and Lucon. Type in Paris Mus.

Cryptoplax montanoi Thiele, Revision Chitonen, 1909, 52 (= *oculata* Q. & G.).

Cryptoplax peroni Rochebrune, Bull. Soc. Philom., Paris, Ser. 7, vi., 1882, 191. New Holland (Peron & Lesueur), based on type of *C. laevis* Lam. in Paris Mus.

Cryptoplax peroni Thiele, Revision Chitonen, 1909, 56 (redescribed).

? *Cryptoplax caledonicus* Rochebrune, Bull. Sci. Philom., Paris, Ser. 7, vi., 1882, 196. New Caledonia (not common). Type in Paris Mus.

Cryptoplax caledonicus Thiele, Revision Chitonen, 1909, 55, pl. vi., figs. 97-102.

Cryptoplax huerteli Rochebrune, Bull. Sci. Philom. Paris, Ser. 7, vi., 1882, 196. New Caledonia (rare). Type in Paris Mus.

Cryptoplax huerteli Thiele, Revision Chitonen, 56, pl. vi., figs. 103-107.

? *Cryptoplax unciniferus* Rochebrune, Bull. Soc. Philom. Paris, Ser. 7, vi., 1882, 196. New Caledonia (common). Type in Paris Mus.

? *Cryptoplax unciniferus* Thiele, Revision Chitonen, 1909, 55 (= *caledonicus* Rochebrune).

Cryptoplax larvaeformis Haddon, Zool. Rep. Challenger, xv., 1886, Polypl. 37, pl. iii., fig. 12 a-m. Fiji.

Cryptoplax larvaeformis Pilsbry, Man. Conch., xv., 1893, 56, pl. 11, figs. 31-36, 40-43. Viti I. specs. Tonga Tabu, Fiji and Philippines.

Cryptoplax larvaeformis Pilsbry, Proc. Mal. Soc., iv., 1901, 154, pl. xiv., figs. 12-16. Viti and Samoa I.

Cryptoplax larvaeformis Nierstrasz, Siboga Exped. Monog., xlviii., 1905, 73, pl. figs. 154-158. Molucca Islands.

Cryptoplax larvaeformis Thiele, Revision Chitonen, 1909, 54, pl. vi., figs. 87-89. Hapai, Tonga group.

Cryptoplax oculatus Haddon, Zool. Rep. Challenger, xv., 1886, Polypl., 41, pl. 1, fig. 10, pl. iii., figs. 10 a-m. Samboangan, Philippine I.

Cryptoplax oculatus Melvill & Standen, Journ. Linn. Soc. (Lond.) Zool., xxvii., 1891, 181. Torres Straits.

Cryptoplax oculatus Pilsbry, Man. Conch., xv., 1893, 55, pl. 9, figs. 1-5 (Haddon's account only).

Cryptoplax oculatus Nierstrasz, Siboga Exped. Monog., xlviii., 1905, 74, pl. , fig. 28, fig. 151-153.

Cryptoplax coronatus Thiele, Revision Chitonen, 1909, 54, ex Rochebrune M.S., specimens of *larvaeformis* from Touga Tabu: probably types of *fasciatus* Quoy & Gaimard, in Paris Mus.

Cryptoplax lamarcki Thiele, Revision Chitonen, 1909, 54, ex Rochebrune M.S., specimens of *larvaeformis* from New Caledonia in Paris Mus.

Cryptoplax lamarkii Dupuis, Bull. Mus. Hist. Nat. Paris, Jr., 1918, 529 (states specimens are part of *laevis* Lam., probably incorrectly, more likely figured shells of *larvaeformis* Blainville with false locality added).

This large species is superficially recognisable by the separation and size of the four last valves, and the posterior insertion plate is thrown very much forward.

Contrasted with *striata* in which the sixth valve is very large, in this form it is very small: the first four valves are generally in contact, the fifth is a little separated and less than the fourth, the sixth further apart and still less, the seventh still further away but slightly larger, while the posterior approaches closely to the seventh and is a little larger. Such is the position of the valves in an adult specimen, but a senile shell may show the valves a little more separated: in the juvenile all the valves are closely in contact, the last valve appearing very large.

The sculpture varies peculiarly: in the immature it may show almost linear sculpture in the posterior valves while retaining nodulose sculpture in the earlier ones: in some half-grown shells the whole of the valves may show nodulose sculpture, while in senile shells this may be worn away and a sculpture of deep concentric growth lines alone be seen. Some specimens show the apices of the valves well raised and peaked, while others show the apex depressed and worn. The girdle spicules are elongate, blunt, and superficially smooth, but microscopically faintly striate.

Dimensions: 107 x 20 mm., 82 x 14 mm. (dried).

Station: Under coral blocks.

Habitat: North Queensland. Extralimital.

Remarks: The complicated history of this species is shown by the synonymy. When Blainville studied the specimens of this Order at the British Museum he labelled two species with the new generic name *Cryptoconchus,* one of these being called *C. larvaeformis.* His essay was at the time denied publication and Burrow, writing a little book on Conchology with access to the British Museum described the species as new, did not use Blainville's generic name, but accepted his specific name. Some years afterwards Blainville was commissioned to prepare the conchological articles for a French Dictionary of Natural Science, and there introduced the new genus but altered the spelling to *Cryptoplax.* The next year Lamarck named the same genus *Chitonellus* introducing two species *laevis* and to *vermiformis,* suppressing the genus *Cryptoplax* or *Chitonellus.* Ten years *striatus,* both in the Paris Museum. Blainville later altered the name *larvaeformis* later Quoy & Gaimard described and figured two more species as *Chiton, C. fasciatus* from Tonga Tabu and *C. oculatus* from New Guinea or Vanikoro. These two have been recently regarded as different species, the former being recognised as a synonym of *larvaeformis,* but they are now shown to be identical. Rochebrune, having access to the material at the Paris Museum, made a number of new species, basing them upon the types of Lamarck, Blainville, Quoy & Gaimard and other specimens. He transferred or destroyed original labels and consequently made all reviews unsatisfactory. His descriptions are inadequate and incorrect, and it is difficult to make certain of any data in connection therewith.

However, from criticism of the known species and localities and the remarks made by those who have examined this material, we conclude that our synonymy shows the facts.

As to the exact synonymy of *oculata* and *larvaeformis* we have shells collected by Dr. Paradice at Maori Reef on the Great Barrier Reef, showing the two "species" exactly, but they are certainly conspecific: these are confirmed by a series collected at Murray I., Torres Straits, at one end of the Reef and another series from Masthead Reef at the other end, both collected by Mr. C. Hedley.

Cryptoplax mystica, n.sp.

(Plate xii., figs. 9, 19, 21, 22, 23, 27, 33.)

Chitonellus striatus Reeve, Conch. Icon., iv., 1847, *Chitonellus,* pl. 1, figs. 4 a-b.

Cryptoplax striatus Haddon, Zool. Rep. Challenger, xv., 1886, Polypl., 39, pl. i., fig. 9, pl. iii., fig. 9 a-m., and of Smith, Pilsbry and recent authors generally, but not *C. striatus* Lamarck.

Cryptoplax torresianus Rochebrune, Ashby, Trans. Roy. Soc. S. Austr., xlvi., 1922, 577/8: not of Rochebrune.

Cryptoplax rostratus Reeve, Ashby, id., xlvii., 1923, 239, pl. xix., figs. 2a, h, c.: not of Reeve.

Shell large, elongate, comparatively broad, last four valves scarcely disconnected when adult, sculpture coarsely nodulose, girdle densely coarsely spiculose.

Colouration of girdle yellow to brown, of shell red brown, grey or yellow, often with a white dorsal stripe.

The broad valves and the lozenge shaped nodulose sculpture with the broad connected valves separate this from all species except the next one.

The posterior valve has the mucro terminal, the post-mucronal slope directed forwards.

Girdle spicules long, pointed, and coarsely striated.

Interior bluish green, darker medially. Posterior insertion plate thrown very abruptly forward and flattened.

Dimensions: 64 x 15 mm. (dried).

Station: Under stones below low water mark, and in worm holes and crevices in soft rocks.

Habitat: New South Wales.

Cryptoplax torresiana.

Cryptoplax torresianus Rochebrune, Bull. Soc. Philom. Paris, Ser. vii., 1882, 195. Torres Straits. Type in Paris Mus.

Cryptoplax torresianus Thiele, Revision Chitonen, 1909, 9 (= *striata* Lam.).

Cryptoplax striatus Smith, Rep. Zool. Coll. Alert, 1884, 84.

Cryptoplax striatus Melville & Standen, Journ. Linn. Soc. (Lond.) Zool., xxvii., 1891, 181. Torres Straits.

Cryptoplax striatus Shirley, Proc. Roy. Soc. Q'ld., xxiii., 1911, 96.

Thiele has stated that Rochebrune's *torresianus* named from Torres Straits is the same as the Port Jackson species (*striata olim*), and Ashby formerly suggested Rochebrune's name should be used for the N.S.W. species. As there is a shell living in North Queensland that simulates the N.S.W. shell we leave *torresiana* to that species. There is a discontinuity of range as the N.S.W. species has not yet been found in South Queensland.

We have examined shells from Cairns, North Queensland, which resemble the Port Jackson shell, but have distinctly coarser sculpture, while they are smaller. The posterior valve appeared to have the mucro not terminal, and the girdle spicules seemed coarser. This we call at present *torresiana.*

A shell from Pelsart I., Abrolhos, West Australia, also resembles the New South Wales species, but though curled and only about 20 mm. in length seems to be adult, the valves being solid: the girdle spicules are striate, while the sculpture is coarse, the nodules more separated and less lozenge shaped: the sutural laminae are more spread out in the median valves and the insertion plate of the posterior valve shorter terminally and less thrown forward.

Cryptoplax striata.

(Plate xii., figs. 7, 12, 15, 20, 29, 36.)

Chitonellus striatus Lamarck, Hist. Anim. s. Vertel, vi., 1819, 317. Seas of New Holland, Peron & Lesueur = Kangaroo I. Type in Paris Mus.

Chitonellus gunnii Reeve, Conch Icon, iv., 1847, *Chitonellus,* pl. i., sp. & fig. 5. Van Diemen's Land. Type in Brit. Mus.

Chitonellus rostratus id. ib., pl. i., sp. & fig. 6. Raines I., Torres St., error = Tasmania. Type in Brit. Mus.

Cryptoplax gunnii Pilsbry, Proc. Mal. Soc., iv., 1901, 156, pl. xv., figs. 17-19, 24-26.

Cryptoplax striatus Ashby, Trans. Roy. Soc. S. Austr., xlvii., 1923, 237, pl. xix., fig. 5. var. *gunni* id. ib.

Cryptoplax striatus May, Illustr. Index Tasm. Shells, 1923, pl. xvi., fig. 6.

Not *Cryptoplax striatus* of authors dealing with specimens from New South Wales.

Shell very large and elongate, valves long and narrow, posterior four disconnected when half-grown, sculpture tending to longitudinal ribbing, girdle densely coarsely spiculose.

Colouration dull, brown and red, sometimes girdle differently coloured or even banded with lighter as in *"rostratus."*

Anterior valves longer than broad, sculpture becoming obsolete.

Median valves lengthened and narrow, the sixth valve large: the second valve broad, rest narrower.

Posterior valve shorter than seventh valve with mucro almost posterior, but post-mucronal slope a little produced backward and concave.

Interior greenish white. Posterior insertion plate large and nearly perpendicular.

Juvenile sculpture resembles that of New South Wales *mystica.*

Dimensions: 92 x 16 mm., 100 x 19 mm., 121 x 15 mm.

Station: Below stones below low water mark.

Habitat: Victoria, South Australia, Tasmania, West Australia.

Remarks: Apparently no one has recently examined Reeve's figure and description of *Chitonellus rostratus* as though he gave "Raines' Island, Torres Straits: Capt. Ince," there can be no hesitation in denying that locality, the figure being a good one of a Tasmanian shell, the surveying ships sheltering in South Tasmania during the hurricane season in Torres Straits. It is certainly not the Port Jackson species with which it has been identified by Ashby.

From all localities two forms of the species are met with and we believe these to be sexual: these are represented by the names *gunnii* and *rostrata.* At present we are unable to definitely separate the many subspecies that exist, while

there may even be two species confused.

West Australian specimens from various places collected by Hull are less elongate, valves less separated, mucro of the posterior valve nearly terminal and the sculpture more nodulose. These we call *C. striata occidentalis* subsp. n. and they are quite different from *Cryptoplax striata* var. *westernensis* Asbby. Trans. Roy. Soc. South Austr., xlvii., 1923, 238, from Rottuest, W.A., coll. Ashby, which is stated to differ in lacking the granulose sculpture with the girdle spicules shorter and more slender: dimensions, 35 x 15 mm.

Cryptoplax iredalei.

(Plate xii., figs. 6, 11, 18, 26, 30, 34.)

Cryptoplax iredalei Ashby, Trans. Roy. Soc. S. Austr., xlvii., 1923, 238, pl. xix., fig. 4. Port Lincoln, Gulf St. Vincent, S. Austr. Type in coll. Ashby.

Cryptoplax gunnii May, Illustr. Index Tasm. Shells, 1923, pl. xvi., fig. 7.

Similar to the preceding in general appearance but easily separable by the very different girdle spicules which are very fine, the girdle appearing like felt.

Colouration distinct: valves purple, girdle purple banded with grey.

The valves are even narrower than those of the preceding species, while the sculpture is even more linear: the smooth dorsal area in the adult becomes concave, showing curved growth lines. Posterior mucro terminal.

Interior pinkish white. Posterior insertion plate produced forward.

Dimensions: 81 x 18 mm., 72 x 21 mm.

Station: Under stones below low water.

Habitat: Victoria, Tasmania, South Australia, West Australia.

Remarks: West Australian shells from Pelsart I., Abrolhos, have even longer and narrower valves, the sculpture irregularly wavy and linear, the smooth dorsal area diminishing in width in the valves posteriorly so that in the last three it appears as a narrow gutter: the girdle spicules are even more delicate than those of the eastern forms. We introduce for it the subspecific name *Cryptoplax iredalei attenuata* n. subsp. On the other hand the South Tasmanian form which has been figured by May as *C. gunnii* is a smaller shell than the typical one, the valves broader, less separated, the sculpture very similar, but the girdle spicules notably larger, pointed, apparently smooth and scattered. The posterior valve has the mucro posterior, but more depressed, and the posterior insertion plate does not slope so much forward. This may be a distinct species, but at present we prefer to name it as a subspecies *Cryptoplax iredalei meridiana* n. subsp. Type from Port Arthur, S. Tasmania. 58 x 11 mm.

Cryptoplax burrowi.

(Plate xii., figs. 13, 31, 32.)

Chiton (*Chitonellus*) *burrowi* E. A. Smith, Rep. Zool. Coll. Alert, 1884, 85: new name for *C. larvaeformis* Reeve not Burrow: also from Port Molle, Queensland (Coppinger). Type in Brit. Mus.

Chitonellus larvaeformis Reeve, Conch Icon., 1847, *Chitonellus,* pl. 1, fig. 3. Port Adelaide, Australia, error = North Queensland.

Not *Cryptoplax burrowi* Haddon, Zool. Rep. Challenger, xv., 1886, Polypl., 42, pl. iii., figs. 11 a-m (which refer to a form of *C. elioti* Pilsbry).

Not *Cryptoplax burrowi* Pilsbry, Man. Conch., xv., 1893, 54, pl. 9, figs. 6-10 (copies).

Shell small for the group, posterior valves separated, sixth smallest, girdle spicules blunt and flattened.

Colouration yellowish brown, girdle yellowish.

In the dried shells the first four valves are in contact, the fifth half a valve length away, the sixth three valve lengths away, the seventh four valve lengths distant, the eighth less than two valve lengths distant.

In size the fifth valve is less than the fourth, the sixth less than the fifth, the seventh larger than the sixth and the eighth larger than the fourth. The sculpture is nodulose in the juvenile, irregularly linear in the adult where it becomes indistinct. The posterior valve has the tegmentum elevated medially, the mucro elevated and posterior.

Interior white. Slitting normal.

Dimensions: 57 x 12 mm. Type.

Station: Among coral blocks.

Habitat: North Queensland.

Remarks: When E. A. Smith named this species he regarded the figure given by Reeve for his *Chitonellus larvaeformis* as sufficiently exact to represent his species. Smith's specimens were from Port Molle, N. Queensland, collected by Coppinger, whereas Reeve had given the locality "Port Adelaide." As in the case of *Haploplax adelaidensis* Reeve discussed in this Monograph, p. 293, Reeve's locality is undoubtedly erroneous and *burrowi* came from Queensland. When Haddon reported upon the Challenger Polyplacophora he reproduced drawings made by Smith from specimens in the British Museum, but it is now seen that Smith had confused another species as the valves figured appear to belong to a form of the *elioti* group, a copy reproduced (pl. xii., fig. 32), being quite unlike that of the true *burrowi* (pl. xii., fig. 31).

Fig. 3. *C. hartmeyeri.*

CRYPTOPLAX HARTMEYERI.

(Plate xii., figs. 14, 37, 38, 39.)

Cryptoplax hartmeyeri Thiele, Die Fauna Südwest Austral, iii., 1911, 405, pl. . Shark's Bay, West Australia. Type in Berlin Mus.

Not *C. hartmeyeri* Ashby.

Thiele differentiated this species from *burrowi* by means of the girdle

spicules which are longer and more slender and flattened. In addition the valves are a little differently spaced and the sculpture is more notable. We here reproduce Thiele's figures as Ashby has altogether misidentified the species, his specimen from Yallingup appearing from his indefinite photographs to belong to the form we have mentioned under *C. torresiana*.

[CRYPTOPLAX ROYANA, n.sp.

(Plate xii., figs. 8, 16, 24.)

Size comparatively small, valves disconnected posteriorly, but not as much as those of *C. larvaeformis* of the same size. Fifth valve large, the last five being almost all the same size, elongate and narrow.

Colouration bright pink mottled with scarlet, anterior valve sometimes white, girdle white.

Anterior valve elongately semicircular, ornamented with longitudinal wrinkly lines wavy anteriorly.

Median valves with smooth dorsal area, wrinkly longitudinal lines, five in number on each side: juvenile sculpture shown by two nodules.

Posterior valve with mucro elevated, terminal, post-mucronal slope nearly perpendicular.

Girdle spicules long and pointed, striate.

Interior white. Posterior plate nearly perpendicular.

Dimensions: 29 x 7 mm.

Station: In crevices of coral rock.

Habitat: Lord Howe Island (Roy Bell).

Note:—While this Monograph excludes the Lord Howe Island Loricates generally, it is deemed desirable to insert the description of this new species here as it forms a connecting link between the southern and northern species].

EXPLANATION OF PLATES.

Plate ix.

Fig. 1. *Acanthochiton bednalli* Pilsbry, whole shell.
2. *Acanthochiton bednalli* Pilsbry, anterior valve.
3. *Acanthochiton bednalli* Pilsbry, median valve.
4. *Acanthochiton bednalli* Pilsbry, posterior valve.
5. *Acanthochiton granostriatus* Pilsbry, whole shell.
6. *Acanthochiton granostriatus* Pilsbry, median valve.
7. *Acanthochiton granostriatus* Pilsbry, posterior valve from behind.
8. *Acanthochiton granostriatus* Pilsbry, posterior valve front view.
9. *Acanthochiton granostriatus* Pilsbry, posterior valve from side.
10. *Acanthochiton thackwayi* Ashby, whole shell.
11. *Acanthochiton thackwayi* Ashby, median valve.
12. *Acanthochiton complanatus* Hull, whole shell.
13. *Acanthochiton complanatus* Hull, anterior valve.
14. *Acanthochiton complanatus* Hull, median valve.
15. *Acanthochiton complanatus* Hull, posterior valve.
16. *Acanthochiton shirleyi* Ashby, whole shell.
17. *Acanthochiton shirleyi* Ashby, median valve.
18. *Acanthochiton shirleyi* Ashby, posterior valve.
19. *Acanthochiton shirleyi* Ashby, interior of.

20. *Acanthochiton macrocystialis* Ashby, whole shell.
21. *Acanthochiton macrocystialis* Ashby, anterior valve.
22. *Acanthochiton macrocystialis* Ashby, posterior valve.
23. *Acanthochiton macrocystialis* Ashby, median valve.
24. *Acanthochiton gatliffi* Ashby, whole shell.
25. *Acanthochiton gatliffi* Ashby, median valve.
26. *Acanthochiton coxi coxi* Pilsbry, whole shell.
27. *Acanthochiton coxi lachrymosus* May & Torr, anterior valve.
28. *Acanthochiton coxi lachrymosus* May & Torr, median valve.
29. *Acanthochiton coxi lachrymosus* May & Torr, posterior valve.
30. *Acanthochiton coxi coxi* Pilsbry, median valve.
31. *Acanthochiton pilsbryi* Sykes, whole shell (living).
32. *Acanthochiton pilsbryi* Sykes, whole shell (dried).
33. *Acanthochiton pilsbryi* Sykes, anterior valve.
34. *Acanthochiton pilsbryi* Sykes, median valve.
35. *Acanthochiton pilsbryi* Sykes, posterior valve.

Plate x.

Fig. 1. *Acanthochiton sueurii* Blainville, whole shell.
2. *Acanthochiton sueurii* Blainville, median valve.
3. *Acanthochiton sueurii* Blainville, posterior valve from side.
4. *Acanthochiton sueurii* Blainville, posterior valve front view.
5. *Acanthochiton kimberi* Torr, whole shell.
6. *Acanthochiton kimberi* Torr, half median valve (W.A.).
7. *Acanthochiton kimberi* Torr, median valve (N.S.W.).
8. *Acanthochiton kimberi* Torr, median valve (S.A.).
9. *Acanthochiton kimberi* Torr, posterior valve.
10. *Acanthochiton kimberi* Torr, interior of posterior valve.
11. *Acanthochiton kimberi* Torr, anterior valve.
12. *Acanthochiton kimberi* Torr. interior of anterior valve.
13. *Acanthochiton crocodilus debilior* Iredale & Hull, whole shell.
14. *Acanthochiton crocodilus* Torr & Ashby, posterior valve.
15. *Acanthochiton purpuratus* Hull, whole shell.
16. *Acanthochiton purpuratus* Hull, posterior valve from side.
17. *Acanthochiton purpuratus* Hull, posterior valve front view.
18. *Acanthochiton wilsoni* Sykes, whole shell.
19. *Acanthochiton sphenorhynchus* Iredale & Hull, whole shell.
20. *Acanthochiton sphenorhynchus* Iredale & Hull, posterior valve.
21. *Acanthochiton aenigma* Iredale & Hull, whole shell.
22. *Acanthochiton aenigma* Iredale & Hull, median valve.
23. *Acanthochiton aenigma* Iredale & Hull, posterior valve.
24. *Acanthochiton curiosus* Iredale & Hull, whole shell.
25. *Acanthochiton curiosus* Iredale & Hull, posterior valve.
26. *Meturoplax retrojecta* Pilsbry, whole shell.
27. *Meturoplax retrojecta* Pilsbry, median valve.
28. *Meturoplax retrojecta* Pilsbry, posterior valve.
29. *Meturoplax retrojecta* Pilsbry, posterior valve from side.
30. *Meturoplax retrojecta* Pilsbry, interior of posterior valve.
31. *Craspedochiton jaubertensis* Ashby, whole shell.
32. *Craspedochiton jaubertensis* Ashby, anterior valve.
33. *Craspedochiton jaubertensis* Ashby, median valve.

34. *Craspedochiton jaubertensis* Ashby, interior of posterior valve.
35. *Craspedochiton jaubertensis* Ashby, posterior valve from side.
36. *Craspedochiton jaubertensis* Ashby, posterior valve front view.

Plate xi.

Fig. 1. *Notoplax costata* H. Adams & Angas, whole shell.
2. *Notoplax extra* Iredale & Hull, whole shell.
3. *Notoplax gabrieli* Ashby, whole shell.
4. *Notoplax macandrewi* Iredale & Hull, anterior valve.
5. *Notoplax costata* H. Adams & Angas, anterior valve.
6. *Notoplax gabrieli* Ashby, anterior valve.
7. *Notoplax macandrewi* Iredale & Hull, median valve.
8. *Notoplax costata* H. Adams & Angas, median valve.
9. *Notoplax gabrieli* Ashby, median valve.
10. *Notoplax macandrewi* Iredale & Hull, posterior valve.
11. *Notoplax costata* H. Adams & Angas, posterior valve.
12. *Notoplax gabrieli* Ashby, posterior valve.
13. *Notoplax macandrewi* Iredale & Hull, posterior valve side view.
14. *Notoplax costata* H. Adams & Angas, posterior valve side view.
15. *Notoplax gabrieli* Ashby, posterior valve side view.
16. *Notoplax subspeciosa* Iredale & Hull, posterior valve.
17. *Glyptelasma m. matthewsi* Pilsbry, whole shell.
18. *Glyptelasma m. occidentalis* Iredale & Hull, anterior valve.
19. *Glyptelasma m. matthewsi* Pilsbry, median valve.
20. *Glyptelasma m. occidentalis* Iredale & Hull, median valve.
21. *Glyptelasma m. matthewsi* Pilsbry, posterior valve.
22. *Glyptelasma m. matthewsi* Pilsbry, posterior valve side view.
23. *Glyptelasma glypta* Sykes, whole shell.
24. *Choriplax grayi* H. Adams & Angas, whole shell.
25. *Choriplax grayi* H. Adams & Angas, anterior valve.
26. *Choriplax grayi* H. Adams & Angas, posterior valve.
27. *Choriplax grayi* H. Adams & Angas, median valve.
28. *Choriplax g. pattisoni* Ashby, whole shell.
29. *Craspedoplax variabilis* Ashby, whole shell.
30. *Craspedoplax variabilis* Ashby, anterior valve.
31. *Craspedoplax variabilis* Ashby, half median valve.
32. *Craspedoplax variabilis* Ashby, posterior valve.
33. *Craspedoplax variabilis* Ashby, interior of unslit posterior valve.
34. *Craspedoplax variabilis* Ashby, interior of slit posterior valve.
35. *Craspedoplax elegans* Iredale & Hull, whole shell.
36. *Craspedoplax elegans* Iredale & Hull, anterior valve.
37. *Craspedoplax elegans* Iredale & Hull, median valve.
38. *Craspedoplax elegans* Iredale & Hull, posterior valve.
39. *Craspedoplax cornuta* Torr & Ashby, whole shell.

Plate xii.

Fig. 1.—*Notoplax macandrewi* Iredale & Hull, whole shell.
2. *Notoplax subspeciosa* Iredale & Hull, whole shell.
3. *Notoplax speciosa* H. Adams, median valve (N.S.W.).
4. *Notoplax mayi* Ashby, median valve (N.S.W.).
5. *Cryptoplax larvaeformis* Burrow, whole shell.

6. *Cryptoplax iredalei* Ashby, posterior valve from side.
7. *Cryptoplax striata* Lamarck, posterior valve from side.
8. *Cryptoplax royana* Iredale & Hull, posterior valve from side.
9. *Cryptoplax mystica* Iredale & Hull, posterior valve from side.
10. *Cryptoplax larvaeformis* Burrow, posterior valve from side.
11. *Cryptoplax iredalei* Ashby, whole shell.
12. *Cryptoplax striata* Lamarck, whole shell.
13. *Cryptoplax burrowi* Smith, whole shell.
14. *Cryptoplax hartmeyeri* Thiele, whole shell.
15. *Cryptoplax striata* Lamarck, posterior valve.
16. *Cryptoplax royana* Iredale & Hull, posterior valve.
17. *Cryptoplax larvaeformis* Burrow, posterior valve.
18. *Cryptoplax iredalei* Ashby, posterior valve.
19. *Cryptoplax mystica* Iredale & Hull, interior of posterior valve.
20. *Cryptoplax striata* Lamarck, interior of posterior valve.
21. *Cryptoplax mystica* Iredale & Hull, posterior valve.
22. *Cryptoplax mystica* Iredale & Hull, median valve.
23. *Cryptoplax mystica* Iredale & Hull, whole shell.
24. *Cryptoplax royana* Iredale & Hull, whole shell.
25. *Cryptoplax larvaeformis* Burrow, anterior valve.
26. *Cryptoplax iredalei* Ashby, anterior valve.
27. *Cryptoplax mystica* Iredale & Hull, whole shell, juvenile.
28. *Cryptoplax larvaeformis* Burrow, whole shell, juvenile.
29. *Cryptoplax striata* Lamarck, whole shell, juvenile.
30. *Cryptoplax iredalei* Ashby, whole shell, juvenile.
31. *Cryptoplax burrowi* Smith, posterior valve.
32. *Cryptoplax burrowi* Smith, posterior valve, *error.*
33. *Cryptoplax mystica* Iredale & Hull, posterior valve, juvenile.
34. *Cryptoplax iredalei* Ashby, posterior valve, juvenile.
35. *Cryptoplax larvaeformis* Burrow, posterior valve, juvenile.
36. *Cryptoplax striata* Lamarck, posterior valve, juvenile.
37. *Cryptoplax hartmeyeri* Thiele, anterior valve.
38. *Cryptoplax hartmeyeri* Thiele, median valve.
39. *Cryptoplax hartmeyeri* Thiele, posterior valve.

Erratum:—An error occurred in the text title of the shrimp figured on plate 1, Part 1. This crustacean is the common Sydney school prawn, and is not found in New Zealand "waters," but is sold in the "markets" of the Dominion. The author of the article spoke of "our examples," and, as he is a New Zealander, the error is easily explainable. This prawn belongs to the genus *Metapenaeus,* and its variable rostrum is well known. It is therefore not entitled to the specific or subspecific distinction suggested by Mr. Phillips; further the name *haswelli* is preoccupied.